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Diseases of Vegetable and Field Crops

In the United States in 1926

September 30, 1927

BUREAU OF PLANT INDUSTRY

UNITED STATES DEPARTMENT OF AGRICULTURE

DISEASES OF VEGETABLE AND FIELD CROPS OTHER THAN CEREALS

IN THE UNITED STATES IN 1926

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INTRODUCTION

The information on which the present summary is based has been furnished for the most part by collaborators of the Plant Disease Survey. The literature of the year, both printed amd mimeographed, has also yielded many notes which have been utilized. Furthermore, various members of the Office of Vegetable and Forage Diseases have assisted materially by supplying notes concerning their observations and collections, by determining specimens, and by reading the manuscript. In the following pages notes will be found by Charles Drechsler, T. P. Dykstra, A. C. Foster, W. W. Gilbert, L. L. Harter, H. G. McMillan, G. B. Ramsey, M. Shapovalov, and J. L. Weimer. To these and to all other persons who have assisted in connection with this summary the Plant Disease Survey is indebted.

The general arrangement and the method of presentation of data is the same as that followed in other years.

DISEASES OF POTATO

POTATO SEED CERTIFICATION

Since 1914 when work was first started potato seed certification has increased very rapidly until now it is being carried on in more than 20 states and several provinces in Canada. In 1926 some four million bushels of certified seed were produced in the United States on about 32,000 acres.

Various agencies have charge of the certification work in the different states. According to Tolaas (16) in ten of the states it is administered by horticultural and extension workers at the agricultural colleges; in six by the State Departments of Agriculture; in four by potato associations working in conjunction with various departments of the agricultural colleges; and in one by a seed improvement association cooperating with the State Department of Agriculture.

At the present time there seem to be two outstanding needs in the seed certification movement,-for the development of uniform standards by the various certifying agencies,and for the protection of certified seed potatoes from fraud

by the misuse of tags. The Potato Association of America through its committee on Seed Certification is making definite progress towards these ends.

It may be of interest to notice the relative importance of the various diseases in causing the disqualification of fields in New York state in 1926. Leafroll caused the highest number of rejections, twenty-four in all, mosaic was next in importance with twenty-one, then came spindle tuber with five, varietal mixture with two, and blackleg with one. H. C. Moore (12) in his statement concerning prevalence in the Great Lake States says that blackleg, Rhizoctonia, and mosaic are the most serious diseases interfering with certification in Minnesota. In Wisconsin, mosaic is a serious problem in Bliss Triumphs. In Michigan, he states that the virus diseases are not considered so troublesome, but blackleg, in certain seasons is a serious problem. In Pennsylvania, mosaic, of which several types are recognized, is said to be the worst disease, with leafroll and giant hill following in order of importance. In Indiana, blackleg is usually the most serious disease found in certified seed, especially on the early varieties such as Early Ohio and Irish Cobbler. Of the late potato diseases in that state, however, leafroll seems to be most important.

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12. Moore, H. C. Problems confronting the certification authorities in the Great Lake States. Proc. Potato Assoc. America 12: 77-80, 1926.

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14. Peppin, S. G. Seed potato certification in Prince Edward Island. Amer. Potato Jour. 3: 325-327. Oct. 1926.

15. Tolaas, A. G. The production of mosaic-free Triumphs. Amer. Potato Jour. 3: 301-302. Sept. 1926.

16. Tolaas, A. G. Administration of seed potato certification. Proc. Potato Assoc. America 12: 70-74. 1926.

17. Wedgworth, H. H. and C. B. Anders. Value of certified Irish potato seed in Mississippi. Mississippi Agr. Exp. Sta. Circ. 60: 1-4. 1925.

18. Werner, H. O. and Wm. Morrow. Factors influencing certification work in the Great Plains States. Proc. Potato Assoc. America 12: 80-83. 1926.

POTATO SPRAYING AND DUSTING

Tests of the relative efficiency of copper dusts and sprays are being made in several states as is shown by the following references.

In Florida, Ensign (2) has reported that liquid Bordeaux was $94.47 more economical per acre than dust in limited tests at Hastings. In Maine, according to Folsom (3), the advantage of spray over dust is not evident and in fact during some seasons neither treatment proves profitable as far as fungous disease control is concerned. In Pennsylvania, Nixon (6) has reported that over an 8-year period, from 1918 to 1925, there was an average increase in yield of sprayed plots over unsprayed of from 34.8 to 78 bushels per acre. In Ohio, Tilford (7) reports good results with dust. In Kansas, White (8) reports no benefit from liquid Bordeaux or copper dust in the Kaw Valley during the 4-year period, 1920-1925.

Recent literature

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2. Ensign, M. R. Shall we spray or dust our Irish potatoes? Florida Grower 35: 4, 11. Jan. 2, 1927.

3. Folsom, D. Potato dusting and spraying comparisons in Maine. Amer. Potato Jour. 3: 149, 152-154. May, 1926.

4. Gibbel, W. W. Why I use the dusting method on my potato crop for the control of insects and the prevention of diseases. Amer. Potato Jour. 3: 163-166. May 1926.

5. Martin, W. H. Potato spraying in 1926. Hints Potato Grow. 7 (7): 1-3. Nov. 1926.

6. Nixon, E. L. The results of eight years of practical potato spraying in Pennsylvania. Amer. Potato Jour. 3: 349-353. Nov. 1926.

7. Tilford, P. E. Potato dusting and spraying in 1925. Ohio Agr. Exp. Sta. Bimonth. Bul. 11: 141-144. July-Aug. 1926.

8. White, R. P. Copper dusts and sprays on potatoes in Kansas. Amer. Potato Jour. 3: 353-355. Nov. 1926.

POTATO SEED TREATMENT

In 1925 Bert Ball (2) sent a questionnaire concerning seed treatment methods to the Department of Agriculture and to the various state experiment stations. In his summary he says that the following states advocated the use of corrosive sublimate: Alabama, Maine, Michigan, Montana, Nebraska, New Jersey, New York, and South Carolina. States which have advocated the hot formaldehyde treatment, according to him, are California, Colorado, Idaho, Iowa, Kansas, Minnesota, Mississippi, Missouri, Ohio, South Dakota, Washington, West Virginia, and Wisconsin, and reports indicated that pre-soaking of potatoes is favored by those who have given it the most careful tests. At that time the new organic mercury disinfectants were not being tested very much, but during the last year several workers have been experimenting with them. (3, 4).

Recent literature

1. Askegaard, E. D. Treating of carloads of seed potatoes at the source. Proc. Potato Assoc. America 12: 98-99. 1926.

2. Ball, B. Methods of treating seed potatoes, practiced by the U. S. Department of Agriculture and the various state experiment stations. Proc. Potato Assoc. Amer. 12: 120-134. 1926.

3. Funk, W. J. and J. Hunter Gooding. Some experiments on the control of potato scab (Actinomyces scabies) with Semesan and other organic mercury compounds. Proc. Potato Assoc. Amer. 12: 109-113. 1926.

4. Martin, W. H. Disinfecting seed potatoes by the dry method. Proc. Potato Assoc. Amer. 12: 99-109. 1926.

5. Melhus, I. E. The hot formaldehyde dip of seed potatoes. Proc. Potato Assoc. Amer. 12: 89-95. 1926.

6. Page, E. M. Missouri's adoption of the hot formaldehyde method on a commercial and community scale. Proc. Potato Assoc. Amer. 12: 95-97. 1926.

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8. Richards, B. L. Seed potato treatment for the control of four common diseases, Rhizoctonia, scab, blackleg, dry rot. Utah Agr. Exp. Sta. Circ. 60: 1-14. Mar. 1926.

9. Vaughan, R. E. and J. W. Brann. Hot formaldehyde for potato seed treatment. Wisconsin Univ. Coll. Agr. Ext. Div. Circ. 202: 1-6. Apr. 1926.

LATE BLIGHT CAUSED BY PHYTOPHTHORA INFESTANS (MONT.) D BY.

Late blight and rot of potatoes was reported to the Plant Disease Survey as occurring widely over the principal late crop area from New England and Pennsylvania westward to Wisconsin, also in the three Pacific Coast States, and in Florida on the early crop. The greatest amount of damage occurred in areas comprising, - 1, western New York, Pennsylvania, except for certain southeastern and southwestern counties, western Maryland, and northern Ohio; 2, northern and eastern Wisconsin; 3, northern Maine; 4, west of the Cascades in Oregon and Washington; and 5, Florida. No late blight was observed by pathologists in the important potato state of Minnesota, although the weather was said to have been favorable for it, nor in Iowa or Virginia where it sometimes occurs. Only comparatively slight amounts were found in southern New England, New Jersey, and West Virginia. The only report for New Jersey was very late in the year when infected tubers were sent to New Brunswick from a small area in Camden County, where blight rot was very bad on stored Jersey Red Skins. What seems to be the first authentic report of the occurrence of late blight in

Indiana was received this year. It was observed in October in Laporte County in the northern part of the state according to M. W. Gardner.

The situation was unusual this year in that the disease generally occurred very late in the season and caused losses not so much from vine blight as from decay of the tubers both in the field and in storage. As will be seen from the accompanying table (49) the earliest reports of appearance, with the exception of Florida, were during August, September, and October. These three months were generally rainy in the sections where the disease occurred. The wet, and in some cases, snowy weather delayed digging and in many places the potatoes were harvested, and in some instances stored, wet. Furthermore, in eastern United States the fall was abnormally prolonged and in many cases vines had not been killed by frost at the time potatoes were dug. This resulted in an unusual amount of tuber rot after harvest in storage, transit, and market.

The loss from late blight in 1926 was probably greater than that during any other year since 1920. When the final figures have been averaged it is likely that the estimated loss for the United States will be between 4 and 5 per cent of the total crop. The accompanying table (50) gives collaborators' estimates of damage both on account of reduction in yield and from rot in storage.

Details concerning the situation have already been given (4). The following statements from collaborators present some additional information.

New York: This year about one-tenth of the late potato crop of New York State will be left in the field because of late blight rot. In addition to this, another tenth of the crop never grew because the vines were killed by late blight. Probably at least a twentieth of the crop will rot in the grower's cellar, in the car or in the hands of the dealer. And not the least of the losses will be the labor of sorting and resorting the potatoes to remove the rotten tubers which are not only useless themselves, but which by their presence, impair the value of the sound ones. (Fernow) (See Fig.20)

Pennsylvania: The first specimen was found on August 18 in Lehigh County. (This is in the section east of the Blue Ridge.) Inside of two weeks all unsprayed fields were almost completely dead throughout this region. The outbreak occurred simultaneously throughout the mountain portions, occurring about ten days later than the eastern outbreak. The extreme southwestern and southeastern portions of the state are the only areas escaping.

Rot is the most severe on record in the state, amounting to from 25 to 150 bushels per acre. The properly sprayed fields have escaped both foliage and tuber infection, and yields of over 500 bushels per acre are being recorded, with 125 bushels per acre increase and over, due to spraying. Dusting is failing as usual. (Nixon) (See Fig.21).

Maryland: Late blight was very severe in unsprayed potato fields in Garrett County this year. On account of the rainy weather which has been prevalent during the past month potatoes could be dug only with great difficulty. Those which have been dug had to be removed from wet soil and most of them are covered with mud. Over 50 per cent of the crop is still in the ground.

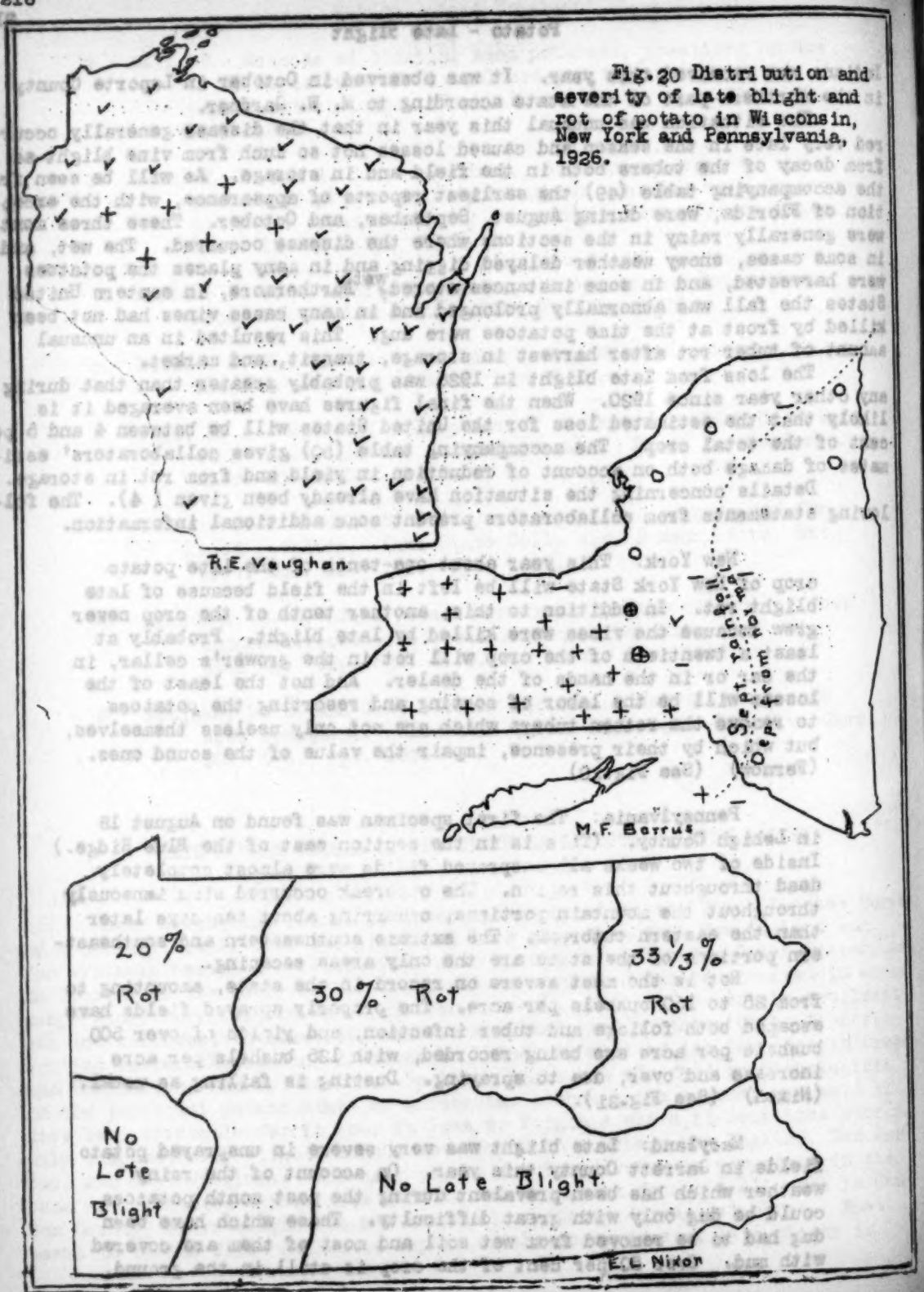

Fig. 20 Distribution and severity of late blight and rot of potato in Wisconsin, New York and Pennsylvania, 1926.

Potato - Late Blight

The ground was covered with snow when I made the inspection and I could not examine any potatoes in the fields, but some growers report that 50 to 75 per cent of the potatoes remaining in the ground are rotting. (Jehle)

Ohio: Many fields in northern Ohio went down completely with late blight the first week in October. Much rotting of tubers occurred in the ground and also in storage. (Tilford)

Michigan: Reported from Van Buren County by H. C. Moore. Considerable leaf infection; no tuber rot. Late blight also occurred in Schoolcraft County but damage from it was prevented by killing frost of September 26. (Kotila)

Wisconsin: Reports coming from all over the state. Losses will be more than for several years. Extreme wet weather in August and September made spraying impossible. Blight rot accompanied by wet bacterial rot in low ground. Most dealers are refusing to accept potatoes for storage when hauled direct from field. Potatoes stored green a total loss. Impossible to make definite statement now but total loss will probably be over 15 per cent of crop. (Vaughan) (See Fig. 22)

Oregon: Causing heavy loss in western Oregon by rot in bin and necessitating heavy culling for market. No control methods in general use. Disease unimportant in average years. (McKay)

Florida: Foliage infection found in all fields. Good commercial control was obtained where the field was properly dusted or sprayed, and in most of the fields the actual loss was small. Several fields which were not dusted were completely killed about four weeks before maturity with at least a 50 per cent decrease in yield.

Considerable damage was caused in the new crop in transit when the tubers were shipped wet and muddy. They were placed in double headed barrels and never dried out. The early shipments from the Federal Point section were the worst but the condition persisted throughout the season. (Gratz)

An account of results with spraying and dusting potatoes for the control of this and other diseases will be found under that heading (page 21[illegible])

Potato - Late Blight

Table 51. Dates and places of first observation of late blight of potato, as reported by collaborators, 1926.

Date	County	State
March	St. John	Florida
August 5	Aroostook	Maine
August 16	Ontario	New York
August 17	Rusk	Wisconsin
August 18	Lehigh	Pennsylvania
September 18	Portage	Ohio
September 25	New Haven	Connecticut
September	Coos	Oregon
October	Laporte	Indiana
October	Coos	New Hampshire

Table 52. Percentage losses from late blight and rot of potato, as estimated by collaborators, 1926.

Percentage loss			State	Percentage loss			State
Total	Reduction in yield	Loss in storage		Total	Reduction in yield	Loss in storage	
53	23	30	Pennsylvania	3	0	3	Oregon
25	10	15	New York	1.5	1.5	-	Conn.
15	13	2	Wisconsin	1	1	-	N. Car.
10	10	0	Florida	0.1	-	-	Calif.
7	5	2	Ohio	trace	-	-	W. Va.
4	3	1	Maryland	trace	-	-	Michigan
3	0	3	New Hampshire				

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2. De Bruyn, H.L.G. The overwintering of Phytophthora infestans (Mont.) D By. Phytopath. 16: 121-140. 1926.

3. _____ Waarnemingen over de vatbaarheid van het loof van de Aardappelplant voor de Aardappelziekte. (Observations on the susceptibility of the foliage of the potato plant to blight.) Tijdschr. Plantenz. 32 1-29. 1926.

4. Haskell, R. J. Late blight and rot of potatoes in 1926. Amer. Potato Jour. 4: 1-5. Jan. 1927.

5. Laneuville, L. Il faut lutter contre le mildiou de la pomme de terre. Petit Jour. Agr. 30: 777. June 20, 1926.

6. Salmon, E. S. and W. M. Ware. Note on the occurrence of diseased shoots arising from potato tubers infected by Phytophthora infestans. Ann. Appl. Biol. 13: 289-300. May 1926.

7. Van Ever dingen, E. Het verband tusschen de weergesteldheid en de Aardappelziekte (Phytophthora infestans). (The relation between weather conditions and potato blight (Phytophthora infestans). Tijdschr. Plantenz. 32: 129-140. 1926.

8. Vowinckel, O. Die Anfälligkeit deutscher Kartoffelsorten gegenüber Phytophthora infestans (Mont.) De By unter besonderer Berücksichtigung der Untersuchungsmethoden. Arb. Biol. Reichsanst. Land-u. Forstw. 14: 588-641. Apr. 1926.

EARLY BLIGHT CAUSED BY ALTERNARIA SOLANI (ELL. & MART.) JONES & GROUT

Early blight is one of the most generally distributed fungous diseases of potato, occurring in practically all states. In 1926, records of occurrence were received from most states east of the Great Plains, but in the West only Colorado, Idaho and Oregon reported it.

In the New Jersey, Delaware, and eastern Maryland area the early or main crops escaped the disease for the most part, but the late crop, planted in August for seed purposes, was damaged considerably. W. H. Martin reported heavy infection in unsprayed and poorly sprayed fields in southern New Jersey, and R. A. Jehle of Maryland wrote that during the week of October 11 he found early blight to be very severe on the late crop grown from northern seed in Worcester County on the Eastern Shore.

In the potato sections along the Atlantic Coast, in Virginia and North Carolina, the early crop was said to be unusually free from this blight. On the other hand, in South Carolina, especially in Beaufort County, early potatoes suffered materially, although not so much as in some other recent years. Regarding the situation there W. D. Moore says:

> "First found in Beaufort County, April 17. On May 12 it was general on all light lands. Some fields reduced from 3 to 5 per cent. Where two applications of a 5-5-50 home-made bordeaux mixture were applied, the trouble was checked. On June 1 practically all fields showed slight infections. Total reduction from 2 to 5 per cent."

In Kentucky, Valleau and Gardner reported that September rains favored early blight development with the result that it became very important on the late crop. It also caused about 15 per cent loss to the early crop according to them.

Potato - Early Blight

More than the average amount of early blight was also reported from Minnesota and North Dakota. In those, as in other states, the disease was associated and complicated with hopperburn. Some fields around Fargo, North Dakota, showed heavy infection early in August.

In some years and in some localities early blight causes heavy losses but the average damage for the country as a whole is probably somewhat less than 1 per cent. The losses in 1926 total about the same as during the past few years. As will be seen from the accompanying table the highest percentage loss estimates came from Delaware and Ohio.

Regarding the susceptibility of varieties, R. E. Vaughan of Wisconsin reported the Ohio and Triumph as very susceptible in that state, and R. A. Jehle of Maryland stated that there was very little early blight in fields of Jersey Redskins and McCormicks, but in fields from northern grown seed (Irish Cobblers) heavy infection occurred.

Early blight is primarily a foliage disease but in recent years the pathologists of the Maine Experiment Station (2) have shown that the fungus also attacks the tubers. Some tuber injury was reported in Maine in 1926, and in Florida, L. O. Gratz, located in the Hastings section, noted that a considerable portion of the Maine seed stock arriving in Florida during December 1925 and January 1926 showed from one to 5 spots approximately 1-5 mm. in diameter. This did not result in much foliage injury, however, and the loss on that score was negligible.

Bonde (1) of Maine has recently isolated several distinct strains of Alternaria solani from tuber lesions and has observed mutations of some of these strains in culture.

Table 53 . Percentage losses from early blight of potato, as estimated by collaborators, 1926.

Percentage loss	States reporting	Percentage loss	States reporting
1.5	Arizona, Delaware, Ohio	0.2	New Jersey
1.	Maryland, Virginia, North Carolina, Louisiana, South Dakota	trace	New York, West Virginia, South Carolina, Georgia, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Oregon.
0.5	Tennessee, Michigan, North Dakota		

Recent literature

1. Bonde, Reiner. Variation of strains of Alternaria solani isolated from lesions on potato tubers. (Abstract) Phytopath. 17: 56. 1927.

2. Folsom, Donald and Reiner Bonde. Alternaria solani as a cause of tuber rot in potatoes. (Abstract) Phytopath. 15: 282-286. 1925.

3. Gagnon, M. J. Early blight of the potato in lower Quebec. Ann. Rept. Quebec Soc. Prot. Plants 18: 33-37. 1926.

SCAB CAUSED BY ACTINOMYCES SCABIES (THAX.) GÜSSOW

Scab is one of the most common diseases of potato, being present practically everywhere the crop is grown but varying greatly in its occurrence and severity with fluctuations in environmental factors such as soil temperature, moisture, reaction, and degree of infestation of the soil, as well as with the extent of infection of the seed, the rate of growth of the tubers, and the variety.

In 1926 it was reported from a great majority of the states. In most of them it was said to be of about the average, or less than average prevalence, but in North Carolina, Indiana, Nebraska, the Kaw Valley of Kansas, and in certain parts of some other states, it was thought to be more prevalent than usual. Some of the collaborators' reports concerning prevalence and losses follow:

New York (Long Island): The money loss from this disease is not great because the percentage of infection is low enough to permit the sale of crop as a whole for No.1 stock. (Clayton)

Kentucky: From St. Mathews, Jefferson County, reports of about 50 per cent infection on about 11,000 acres were received. Some crops cut in price as much as 20 per cent. Some as little as 5 per cent. The yield of scabby potatoes is generally higher than those free. (Gardner)

North Carolina: Potato scab was rather severe this year, especially on scab-infested soil. In some instances more than 50 per cent of the tubers were sufficiently scabbed to be rejected from U. S. Grade No. 1. It is likely that dry weather with low moisture content of the soil was responsible for the prevalence of this disease. (Fant)

Texas: An epidemic of this disease in the lower Rio Grande Valley around San Benito and Brownsville. Found everywhere on all soils and where treated and certified seed was used and on untreated seed. The disease was favored by an unusually wet and cool period during the spring months. (Taubenhaus)

Arkansas: Quite common this year with typical raised blisters, symptoms which are rare in this state. Instead of these symptoms there are usually found deep pits with heavily callousedi margins. Is this injury due to scab? Whatever the cause, these pits are quite common and are often taken to be scab. (Rosen)

Missouri: In Jackson County this disease is entirely controlled by means of seed treatment and seed certification. In one field visited a check plot showed heavy infestation of scab. In southern Missouri it was common to find scab infection as high as 25 per cent. Seed treatment of course had not been used. (Archer)

Oregon: Not an important disease in the State. Troublesome only in some sections as in eastern portion on early market crop. (McKay)

The percentage loss in grade, or the percentage of culls, on account of scab as reported by collaborators from some of the states is given in table 54

Potato varieties differ considerably in their susceptibility to scab. Lutman (8) has shown that resistance is correlated with thickness of skin, the tubers having the thickest skin, as with the russet type, being the most resistant. Table 55 summarizes the information on file in the Plant Disease Survey with regard to the susceptibility of individual potato varieties. It shows rather close agreement of various authorities as to which varieties are susceptible and which ones are resistant. It also shows that varieties within a group all tend to exhibit the same characteristics as regards susceptibility to scab. Thus the Green Mountain group as a whole appears to be susceptible, while the Burbank and Rural groups show resistance.

Treatment of the seed with corrosive sublimate or formaldehyde, either cold or hot, is one of the standard methods of scab prevention. Organic mercury compounds used as a dust or a dip were reported by W. H. Martin to have given satisfactory results as a seed disinfectant for scab in New Jersey last year. The recent progress in potato seed treatment has already been discussed (see page 231).

Sanford (9) has recently made a study of some of the factors influencing the pathogenicity of the potato scab organism. He has attempted to learn the reason for reported reduction in the amount of scab following the plowing under of green rye crops and concludes that if control is secured by this means it is probably not because of an increase in soil acidity but for some other reason, and suggests that it may be on account of competition of the scab bacterium with other microorganisms which are increased in the soil by the turning under of the rye crop.

Table 56. Percentage loss in grade of potatoes on account of scab. 1926.

Percentage loss	States reporting	Percentage loss	States reporting
8	Texas		
5	New Jersey, Missouri, Kansas	1	Virginia, North Carolina
3	New York	0.5	California
2	Maryland, Minnesota, Iowa, Arizona	trace	Majority of other states

Table 57. List of scab resistant and scab susceptible varieties of potatoes as reported by Plant Disease Survey collaborators and others.

Group and Variety	Reported as		Percentage clean tubers in tests	State	Authority	Year
	Resistant	Susceptible				
1. COBBLER GROUP						
Irish Cobbler	--	x	--	Kans.	R. P. White	1924
	--	x	--	Mich.	J. E. Kotila	1926
	--	x	--	N. J.	W. H. Martin	1922
		x	40.8	N.J.	W. H. Martin	1924
		x	--	N. J.	W. H. Martin	1926
		x	--	N. Y.	Charles Chupp	1924
	--	x	--	Pa.	C. R. Orton	1924
	--	x	38	Wisc.	Brann & Vaughan (1)	1921
	--	x	21.5	Wisc.	Brann & Vaughan (1)	1923
2. TRIUMPH GROUP						
Triumph	--	x	--	Gen-eral	L. R. Jones (6)	1903
		x	--	Mich.	J. E. Kotila	1906
		x	49	Wisc.	Brann & Vaughan (1)	1921
		x	4.9 *	Vt.	Lutman (8)	1919
4. ROSE GROUP						
Early Rose	--	x	--	Gen-eral	L. R. Jones (6)	1903
	--	x	--	Europe	L. R. Jones (6)	1903
	--	x	--	Pa.	C. R. Orton	1913
5. EARLY OHIO GROUP						
Early Ohio	--	x	--	Gen-eral	L. R. Jones (6)	1903
	--	x	--	Iowa	I. E. Melhus	1917
	--	x	--	Kans.	R. P. White	1924
	--	x	--	Wisc.	Brann & Vaughan (1)	1921

Group and Variety	Reported as Resistant	Reported as Susceptible	Percentage clean tubers in tests	State	Authority	Year
6. HEBRON GROUP						
Beauty of Hebron	--	x	--	General	L. R. Jones (6)	1903
7. BURBANK GROUP:						
Money Maker	x	--	52.1	Vt.	Wm. Stuart (10)	1914
Cambridge Russet	x			Mich.	L. R. Jones (6)	1903
	x			N. Y.	L. R. Jones (6)	1903
	x		63.5	Vt.	Lutman (8)	1919
Russet Burbank (Netted Gem)	x			Minn.	Sect. Pl. Path.	1917
	x			Minn.	Sect. Pl. Path.	1918
	x			Idaho	O. A. Pratt	1915
	x			Idaho	C. W. Hungerford	1924
	x			Idaho	C. W. Hungerford	1925
	x		60.6	Vt.	Lutman (8)	1919
Scab-proof	x		67.9	Vt.	Lutman (8)	1919
	x			Wisc.	L. R. Jones (6)	1903
Burbank	x		61.8	N. J.	W. H. Martin	1923
		x	37.0	N. J.	W. H. Martin	1924
	x		68	Wisc.	Brann & Vaughan(1)	1921
8. GREEN MOUNTAIN GROUP						
Green Mountain		x		Ky.	J. S. Gardner	1922
		x		Mich.	J. E. Kotila	1926
		x		N. J.	W. H. Martin	1922
		x	6.2	N. J.	W. H. Martin	1923
		x	28.4	N. J.	W. H. Martin	1924
		x		N. J.	W. H. Martin	1926
		x		N. Y.	Charles Chupp	1924
		x		Pa.	C. R. Orton	1924
		x		R. I.	L. F. Kinney (7)	1891
		x	2.9	Vt.	Lutman (8)	1919
		x		Wisc.	Brann & Vaughan(1)	1915
		x	60	Wisc.	brann & Vaughan(1)	1921
		x		Wisc.	R. E. Vaughan	1922
		x		Wisc.	R. E. Vaughan	1923
Norcross		x		N. J.	W. H. Martin	1926
		x		Vt.	Lutman (8)	1919
Idaho Rural		x		Idaho	Hungerford	1924
		x		Idaho	Hungerford	1925

Group and Variety	Reported as: Resistant	Reported as: Susceptible	Percentage clean tubers in tests	State	Authority	Year
9. RURAL GROUP						
Carmen No.3	x			Ohio	L. R. Jones (6)	1903
	x			N. Y.	L. R. Jones (6)	1903
	x			Vt.	L. R. Jones (6)	1903
Million Dollar	x		59.3	Vt.	Wm. Stuart (10)	1914
No. 9	x		50.6	N. J.	W. H. Martin	1923
	x		56.0	N. J.	W. H. Martin	1924
Rural New Yorker	x			Iowa	I. E. Melhus	1917
	x			Mich.	J. E. Kotila	1926
	x		50.4	N. J.	W. H. Martin	1923
	x			Pa.	C. R. Orton	1924
	x			Wisc.	R. E. Vaughan	1917
	x			Wisc.	R. E. Vaughan	1918
	x			Wisc.	R. E. Vaughan	1919
	x			Wisc.	R. E. Vaughan	1920
	x		76	Wisc.	Brann & Vaughan(1)	1921
	x			Wisc.	R. E. Vaughan	1922
Late Petosky (Rural Russet)	x			Mich.	H. C. Moore	1924
	x			Mich.	J. E. Kotila	1926
	x			N. J.	W. H. Martin	1923
	x		69	N. J.	W. H. Martin	1924
	x			N. J.	W. H. Martin	1926
	x			N. Y.	Charles Chupp	1924
	x			Pa.	C. R. Orton	1924
UNCLASSIFIED AMERICAN VARIETIES						
American Giant	x			N. J.	L. R. Jones (6)	1903
	x			N. J.	W. H. Martin	1922
	x		62.6	N. J.	W. H. Martin	1923
	x		60.0	N. J.	W. H. Martin	1924
	x			N. J.	W. H. Martin	1926
	x			N. Y.	Charles Chupp	1921
Aurora	x			Vt.	L. R. Jones (6)	1903
Rehobeth		x		Md.	J. B. S. Norton	1915
Reading Russet		x	1	Vt.	Lutman (8)	1919
Rough Diamond	x			Mass.	Humphrey (5)	1891
White star		x	3	Vt.	Lutman (8)	1919
Smooth skin varieties		x		West States	Shapovalov	1921
		x		Calif.	D. G. Milbrath	1923

Group and Variety	Reported as Resistant	Reported as Susceptible	Percentage clean tubers in tests	State	Authority	Year
UNCLASSIFIED AMERICAN VARIETIES (Cont.)						
Early varieties		x		Wyo.	H. G. McMillan	1920
		x		Wisc.	R. E. Vaughan	1922
UNCLASSIFIED EUROPEAN VARIETIES						
Boncza	x			Europe	L. R. Jones (6)	1903
	x		74.2	Vt.	Wm. Stuart (10)	1914
Dabersche		x		Germ.	L. R. Jones (6)	1903
Discovery	x		50.3	Vt.	Wm. Stuart (10)	1914
Eureka	x		52.1	Vt.	Wm. Stuart (10)	1914
Fürst Bismark	x		61.4	Vt.	Wm. Stuart (10)	1914
Irene	x			Europe	L. R. Jones (6)	1903
Ninety-fold	x		59.9	Vt.	Wm. Stuart (7)	1914
		x	0.7	Vt.	Lutman (8)	1919
Pomerania	x			Vt.	Wm. Stuart (10)	1914
Prof. Wohltmann	x		50.2	Vt.	Wm. Stuart (10)	1914
	x			Europe	L. R. Jones (6)	1903
Richter's Imperator	x			Germ.	L. R. Jones (6)	1903
Sir John Llewellyn	x		60.6	Vt.	Wm. Stuart (10)	1914

Footnote:

Lutman's figures represent the average of three annual tests.

Literature

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2. Craig, J. Potato Scab. In Report of the Horticulturist. Can. Cent. Exp. Farms, Rpt. 1897: 116-118. 1898.

3. Fellows, H. Relation of growth in the potato tuber to the potato scab disease. Jour. Agr. Res. 32: 757-781. 1926.

4. Funk, F. J. and J. H. Gooding. Some experiments on the control of potato scab (Actinomyces scabies) with semesan and other organic mercury compounds. Proc. Potato Assoc. Amer. 12: 109-113. 1926.

5. Humphrey, J. E. Potato scab. In Eighth Ann. Rept. Massachusetts Agr. Exp. Sta. 1890: 216-220. 1891.

6. Jones, L. R. Disease resistance of potatoes. U. S. Dept. Agr. Bu. Pl. Ind. Bul. 87: 1-39. 1903.

7. Kinney, L. F. The potato scab. Rhode Island Agr. Exp. Sta. Bul. 14: 183. 1891.

8. Lutman, B. F. Resistance of potato tubers to scab. Vermont Agr. Exp. Sta. Bul. 215: 1-30. 1919.

9. Sanford, G. B. Some factors affecting the pathogenicity of Actinomyces scabies. Phytopath. 16: 525-547. Aug. 1926.

10. Sanford, G. B. The relation of some soil factors to the development of common scab of potatoes. Proc. Potato Assoc. Amer. 12: 113-120. 1926.

11. Stuart, William. Disease resistance of potatoes. Vermont Agr. Exp. Sta. Bul. 179: 147-183. 1914.

BLACKLEG CAUSED BY BACILLUS PHYTOPHTHORUS APPEL

Blackleg occurs widely with the potato crop, but, depending on the seed source and other factors, for the most part is more or less localized or scattered in its distribution. It seems to be most common and troublesome in the northern potato states and, as these states grow a large proportion of the seed crop, it is spread far and wide with the seed stock and sometimes causes heavy local losses in central and southern states where infected seed is planted.

The prevalence of blackleg in 1926 as compared with last year and the average year as reported by collaborators is given in table 57 . More than usual prevalence was reported from New York, New Jersey, Michigan, Missouri, Idaho, and Louisiana.

In Maine considerable damage was occasioned in some fields. No definite estimate of loss for the state is available, but some fields with high percentages (10 per cent) were reported. The Maine reporter stated that the damage seemed to occur in isolated cases and remarked that imported Canadian seed was showing more of the disease than was formerly the case. In New Hampshire the disease was reported again from the Colebrook area in the extreme northern part of the state where it seems to be largely confined. In New York the Monroe County Farm Bureau reported that blackleg was found in practically every

shipment of Michigan seed. In New Jersey it was found only in fields planted with seed from two northern sources. As high as 15 per cent was found in some fields planted with this seed. In Kentucky a field of 4 acres showed 75 per cent reduction in yield from what appeared to be mostly blackleg. F. P. McWhorter of the Virginia Truck Experiment Station reported that blackleg seemed to be the most serious potato disease in the Norfolk section in 1926, as it was widely distributed and was occasionally severe. In the North Carolina early potato sections also it was rather prevalent. In the Hastings section of Florida, however, according to L. O. Gratz, only a little of the disease was observed and the loss was no more than a trace. In Michigan, J. E. Kotila reported blackleg more prevalent than usual with some fields showing 6 per cent. On August 1 he reported that it was found in most fields visited in Lower Michigan but was probably more abundant in Upper Peninsula fields where weather conditions of July were more favorable. R. W. Goss noted that it was present only in eastern Nebraska where a trace to 5 per cent infection occurred in fields planted to northern grown seed. Considerable infection was observed in Douglas County, Nebraska, in plantings of Early Ohio from the Red River Valley. In Wisconsin collaborators reported it as a very minor trouble. In the Kaw Valley of Kansas the disease was of about average severity. As high as 10 per cent infection was observed in some fields. From Idaho, C. W. Hungerford reported that a slight annual increase in amount of blackleg seemed to be occurring. Warm dry weather was said to be unfavorable to the disease in Oregon.

The estimated losses by states are given in table 58.

A paper by J. G. Leach (3) on the relation of the seed-corn maggot to potato blackleg, published during the year, reports a mutualistic symbiosis between the seed-corn maggot and the organism, or organisms, causing blackleg. The bacteria are associated with, or carried by, the insect in all its stages and hibernate within the puparia. The insect inoculates the potato tuber with the pathogene and assists in the development of the disease by destroying the wound cork naturally formed by the seed-piece to ward off the disease. From the standpoint of the insect the bacteria are necessary for normal growth, for when larvae are deprived of them as food they remain stunted and die early. The results of this investigation answer some hitherto puzzling questions. They explain the occurrence of blackleg in fields planted with seed that is known to be free from blackleg infection, show that seed-piece contamination at cutting time is probably not so important as has been commonly believed, demonstrate that in the control of blackleg the seed-corn maggot must be considered, and indicate, although this has not been proved, that a poison on the surface of the cut seed-piece may be effective in killing the maggots as they attack and thus prevent injury.

Three collaborators mentioned this insect relationship in their reports.

Virginia: This season's notes give clear proof that the disease may come from the soil. We are particularly interested in the relation to insects. (McWhorter)

Kansas: We have been able to check upon the relationship of the seed-corn maggot to blackleg, finding maggots in most of the seed-pieces that are decayed and in diseased stems. Pupae, young adults, mature adults, and eggs were also collected indicating that the second brood of seed-corn maggot flies is here. (White) (June)

Potato - blackleg

Missouri: Last year (1925) some fields had 75 to 80 per cent loss even on certified seed. Infection probably due to maggot injury to seed-pieces. (Page)

Table 59. Estimated average percentage loss from, and relative prevalence of potato blackleg in 1926, as reported by collaborators, 1926.

State	Estimated percentage loss 1926	Prevalence compared with 1925	Prevalence compared with Average year	State	Estimated percentage loss 1926	Prevalence compared with 1925	Prevalence compared with Average year
Mo.	7	less	more	N. Y.	0.6	more	more
Minn.	3	same	same	Oreg.	0.5	less	less
Kans	3	same	same	Mont.	0.5	--	--
Ariz.	2.5			N. J.	0.2	much more	more
N. Dak.	2.	less	less	N. H.	trace	same	same
N. Car.	1.5	--	--	W. Va.	trace	--	--
Md.	1	same	same	Fla.	trace	same	same
Mich.	1	more	more	La.	trace	more	more
Iowa	1	less	less	Ohio	trace	less	less
S. Dak.	1	--	--	Wisc.	trace	--	--
Idaho	0.75	more	more	Colo.	--	same	same
				Wash.	trace	same	same
				Calif.	trace	--	--

Recent literature

1. Berridge, Emily M. Studies in bacteriosis. XIV. Chemical agglutination as a means of differentiating bacterial species causing soft rot of potatoes and other vegetables. Ann. Appl. Biol. 13: 12-18. 1926.

The results indicate that chemical agglutination tests are as reliable as those with serum in the case of Bacillus phytophthorus, B. carotovorus, and B. solanisaprus. They show also that the three organisms are all different.

2. Lacey, Margaret S. Studies in bacteriosis. XIII. A soft rot of potato tubers due to Bacillus carotovorus and a comparison of the cultural, pathological and serological behavior of various organisms causing soft rots. Ann. Appl. Biol. 13: 1-14. 1926.

The tests show that Bacillus carotovorus, B. phytophthorus, and B. solanisaprus are closely related but that there are sufficiently marked and constant differences to warrant their continued separation into different species.

3. Leach, J. G. The relation of the seed-corn maggot (Phorbia fusciceps Zett.) to the spread and development of potato blackleg in Minnesota. Phytopath. 16: 149-176. 1926.

STEMROT AND SCURF CAUSED BY CORTICIUM VAGUM BERK. & CURT. (RHIZOCTONIA SOLANI KÜHN)

Rhizoctonia is one of the most widespread and important fungous parasites of potato, causing rotting of sprouts, missing hills, girdling of stems, rosetting of tops, and scurf and russeting of the tubers. In 1926 it was reported as occurring in about the same amounts as usual in most states although New Jersey, Maryland, Louisiana, Arkansas, and Arizona reported more than normal prevalence, and New Hampshire, Illinois, Iowa, Kansas, and Oregon reported less. The losses as estimated by collaborators are given in table 60 . The estimated average percentage losses for the United States for the past eight years have been: 1918, 2.2; 1919, 2.0; 1920, 2.0; 1921, 2.7; 1922, 2.9; 1923, 2.7; 1924, 2.7; 1925, 2.8; eight year average, 2.5. It will be noted that the losses have not fluctuated much.

Some of the collaborators' reports are given herewith:

New York (Wyoming Co.): More than one-tenth of the potatoes planted in this county this year were destroyed by Rhizoctonia. (Woodward)

(Ontario Co.): Rhizoctonia on untreated seed has caused an uneven stand on many potato fields. (Pease)

(Nassau Co.): Rhizoctonia is present to some extent. (Boyce)

New Jersey: Most of the damage resulted before the plants came through the ground. The trouble was most severe on light soils. The dip treatments with the organic mercury compounds gave as efficient control of scurf as $HgCl_2$. (Martin)

Maryland: This disease made its first appearance in our early Cobblers soon after they began to sprout, killing and injuring many young sprouts and causing an uneven stand. The trouble was general, but was much more severe in some fields than in others. Later the disease made its appearance in the field with the usual rosette symptoms. The loss was only slight in the early crop, since few plants were affected. However, in the late crop in western Maryland losses were very severe from this phase of the disease, some fields inspected for certification having as high as 8 per cent of the plants affected. In the early crop a third phase of the disease was unusually severe. This phase of the disease caused a fine cracking of the skin giving the tubers a russeted appearance. The injury was so severe in many cases that the potatoes could not be placed in the U. S. No. 1 grade. (Jehle)

Kentucky: Injury to sprouts in early crop. Apparently no injury to late crop and no sclerotia on late crop potatoes. (Gardner & Valleau)

South Carolina(Beaufort Co.): Fields planted with untreated seed damaged from 5 to 20 per cent by bad stands and infected growing plants. General losses from 5 to 10 per cent. (Moore)

Florida: Less than 1 per cent of the plants show symptoms, and the actual loss in yield is much less than one-half per cent. However, slightly more plants had Rhizoctonia symptoms this year than last year. These symptoms appeared comparatively early, and disappeared to a large extent later on. (Gratz)

Missouri: This is most severe disease of potato. The average untreated field will run 70 to 90 per cent infection. Treated fields have 10 to 20 per cent infection. Loss in untreated fields is 20 per cent. (Page)

Nebraska: Very slight sprout infection. More stem girdling of large plants and considerable sclerotia. (Goss)

Kansas: Untreated fields and check plots are showing from 40 to 80 per cent diseased plants. Treated fields or parts of fields show from none to 40 per cent diseased plants. (White)

Washington: Generally prevalent in all parts of the state. Considerable damage is done throughout the season. The disease is of minor importance as compared with the virus diseases. (Dept. Pl. Path.)

Oregon: This disease is doing the usual amount of damage. It is a major factor in reducing yields in Oregon. (Barss)

Arizona: General. Severe in Greenlee County, Duncan District. Maximum reduction in yield 50 to 60 per cent, 90 per cent infection in some fields. No difference in susceptibility of varieties (Peerless, Early Ohio, etc.). Cold wet season after planting and too much irrigation water. Formaldehyde treatment (cold solution) and certified seed ineffective. Beans and other crops also attacked. (Brown)

The acidulated corrosive sublimate treatment reported by Cunningham (2) from New Zealand in 1925 has been tested further by Cunningham and Neill (3) who state that although the results in the laboratory were excellent under the conditions of their experiments the treatment did not appear to be so satisfactory when put into actual practice. For other notes on control see "Potato Seed Treatment" page 61 .

Potato - Stemrot and Scurf; Wilt.

Table 62 . Percentage losses from stemrot and scurf of potato as estimated by collaborators, 1926.

Percentage loss	States reporting	Percentage loss	States reporting
15	Arizona	1	Virginia, Louisiana,
10	Missouri, Oregon		Wisconsin, Iowa,
7	Kentucky, Kansas		Montana
4	Maryland, Minnesota	.5	Connecticut, New
3.5	New Jersey, North		York
	Dakota	.1	Florida
3	South Carolina,	.25	Michigan
	Arizona	trace	West Virginia, Georgia,
2	North Carolina,		Arkansas, Texas, Ohio
	South Dakota,		
	Idaho, Washington		
	California		

Recent literature

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2. Cunningham, G. H. Corticium-disease of potatoes. New Zealand Jour. Agr. 30: 14-21. Jan. 1925.

3. _____ and J. C. Neill. Corticium-disease of potatoes. New Zealand Jour. Agr. 33: 174-175. Sept. 1926.

WILT CAUSED BY FUSARIUM SPP.

Several states reported the occurrence of Fusarium wilt caused by F. oxysporum but in none of them was much damage reported except locally. Of the states reporting, Ohio and Minnesota reported less than the usual amount, and Virginia reported more. In Northampton County on the eastern shore peninsula of Virginia, where some 3,000,000 bushels of early potatoes are grown, considerable trouble from what appeared to be Fusarium wilt was reported, with as high as 30 per cent infection being observed in some fields. In the Grand Junction-Fruita section of western Colorado, H. G. McMillan, located at Greeley, Colorado, reported that the disease was general and very severe and that the early Irish Cobbler crop was practically an entire loss, there being estimated an 80 per cent reduction in yield.

Comparatively few collaborators ventured to make estimates of losses from Fusarium wilt for their states, however, it was thought that perhaps 3 per cent reduction in yield occurred in Virginia and Montana, 2 per cent in

Oregon, 1.5 per cent in North Dakota, and 1 per cent in Maryland, Michigan, Texas, and California. Only a very small fraction of a per cent loss was reported from North Carolina, Georgia, Louisiana, Ohio, Wisconsin, Missouri, Washington, and Arizona.

Recent literature

1. Morris, H. E. Field wilt (Fusarium) of potatoes. Montana Agr. Exp. Sta. Bul. 184: 1-14. 1926.

STORAGE ROTS CAUSED BY FUSARIUM SPP.

Although Fusarium storage rots are of considerable importance only a very few state collaborators sent in reports concerning them in 1926.

Missouri: Probably high infection but commercial produce is sold immediately. Home garden produce, when stored, shows high loss. (Page)

Washington: Usual amount of loss from Fusarium storage rots in 1925 crop. (Dept. Pl. Path.)

Recent literature

1. Morris, H. E. Storage dry rot of potatoes. Montana Agr. Exp. Sta. Bul. 183: 1-10. 1926.

WILT AND STEM-END ROT CAUSED BY FUSARIUM EUMARTII CARPENTER

High temperatures and low moisture in Nebraska favored wilt and decreased stem-end rot of the tubers, according to R. W. Goss. As usual the disease was very important in that state. What seems to be the same disease was reported for the first time from Iowa by I. E. Melhus. No specimens were received however.

WILT CAUSED BY VERTICILLIUM ALBOATRUM REINKE & BERTH.

The Verticillium wilt was reported by collaborators from Maine, Florida, Oregon, and California. In the first two states the losses were said to be very slight. In Oregon, however, M. B. McKay estimated the loss at 4 per cent and

in California, D. G. Milbrath estimated it at 1 per cent. In Oregon, according to McKay, it is more common and disastrous than Fusarium wilt and is generally distributed in most counties. It is being brought more under control there by roguing and rotation. All varieties noted were susceptible.

Recent literature

1. Curzi, M. La tracheo-verticilliosi della Patata in Italia. (Tracheoverticilliosis of potato in Italy.) Riv. Patol. Veg. 16: 77-83. 1926.

2. McKay, M. B. Further studies of potato wilt caused by Verticillium albo-atrum. Jour. Agr. Res. 32 (5): 437-470. 1926.

3. _____ Potato wilt and its control. Oregon Sta. Bul. 221: 1-23. 1926.

BACTERIAL WILT CAUSED BY BACTERIUM SOLANACEARUM EFS.

Maryland, South Carolina, and Florida are the only states reporting this disease in 1926. Some of the states where it is known to have occurred in the past, but which sent in negative reports for 1926, are Virginia, Tennessee, Georgia, and Louisiana.

Maryland: A trace of bacterial wilt was found in several fields of Cobbler potatoes inspected for certification. In one field an area of about 1/16 of an acre located in a low portion of the field was entirely killed out and scattered plants in the adjacent area were becoming infected. (Jehle)

South Carolina: First found near Beaufort April 22. Found in all fields inspected by June 1. Reduction in yield trace. (Moore)

Florida: A trace only was found. This disease seems to be localized chiefly in one or two fields while elsewhere usually but an occasional hill is observed.

WART CAUSED BY SYNCHYTRIUM ENDOBIOTICUM (SCHILB.) PERC.

No extension of the infested areas in Pennsylvania, Maryland, and West Virginia were reported to the Plant Disease Survey during the year. The situation in these three states is given in the following quotations from collaborators.

Potato - Wart

Pennsylvania: The potato wart disease is now present in eight hundred and thirteen gardens and one farm; these infections occurring in fifty-eight towns and villages in eleven counties of Pennsylvania.

In 1923 it was decided to begin a resurvey of Pennsylvania starting with the known warted areas as a center and to expand the survey from these centers each year as funds and time permit until the whole state is covered.

In the present survey work every town and village in the county being surveyed is covered, except large cities, and in each town or village surveyed every garden is looked over and if potatoes are found growing a note is made of the variety and if susceptible an inspection is made for the presence of the wart disease. This inspection is made as follows: The inspector examines a plant, every tenth throughout the row, and in every other row. To do this the plant need not be pulled out for inspection, since the presence of wart can be detected on the stem of the plant by carefully removing the soil to a depth of about four inches, for rarely is wart found below this depth, and usually at the surface or at most one to two inches below the surface. If wart is not found the soil is replaced and no injury follows the inspection. This fact is of considerable value, since it tends to prevent hostility or interference with the inspections. (McCubbin)

Maryland: We have no further information on wart this year. Inspection of Westernport and adjoining territory was made last year, as well as gardens adjacent to the wart infected premises. No new infected gardens were found. The situation is, therefore, the same as last year. (Jehle)

West Virginia: There are no particularly new developments in West Virginia up to the present time. The quarantine is still enforced and planting under permit is allowed. The known infected area has been increased slightly but it is merely another garden or two at Thomas. (Giddings)

In Pennsylvania (1) the resistant McCormick has been crossed with the susceptible Rural Group, with the result that three lots of seedlings showing some promise as commercial varieties have been developed.

Table 63 - Potato wart survey in Pennsylvania, 1926.

County	Towns	No. gardens planted to potatoes	No. gardens planted to immune varieties	No. gardens planted to susceptible varieties	No. gardens found to contain wart disease
Cambria	3	46	14	32	0
Fulton	20	99	33	66	0
Bedford	16	83	25	58	0
Indiana	4	33	14	19	0
Somerset	28	149	32	117	0
Fayette	9	116	42	74	0
Tioga	5	194	6	188	0
Totals 7	86	720	166	541	0

The 1926 literature on potato wart from countries outside of the United States is very extensive and space will permit the listing of only a few of the more important references.

Recent literature

1. Anon. Potato wart project. In Pennsylvania Agr. Exp. Sta. Bul. 204 (Ann. Rept. 39: 1925-26): 18. 1926.

2. Botjes, J. G. O. De stand van het vraagstuk der bestrijding van Aardappelwratziekte. (The position of the question of the control of Potato wart disease.) Tijdschr. over Plantenziekten 32 (2): 33-44. 1926.

3. Cartwright, Katherine. On the nature of the resistance of the potato to wart disease. Ann. Bot. 40: 391-396. Apr. 1926.

4. Doidge, Ethel M. Wart disease of potatoes (Synchytrium endobioticum Pers.) Jour. Dept. Agr. South Africa 12 (2): 161-169). 1926.

5. Esmarch, F. Untersuchungen zur Biologie des Kartoffelkrebses. I. Angew. Bot. 8: 102-135. 1926.

6. Glynne, Mary D. The viability of the winter sporangia of Synchytrium endobioticum (Schilb.) Perc., the organism causing wart disease in Potato. Ann. Appl. Biol. 13 (1): 19-36. 1926.

7. Glynne, M. D. Wart disease of potatoes: the development of Synchytrium endobioticum (Schilb.) Perc., in "immune" varieties. Ann. Appl. Biol. 13: 358-359. Aug. 1926.

8. Kohler, E. Fortgeführte Untersuchungen über den Kartoffelkrebs. Biol. Reichsanst. fürLand- und Fortwirtsch. 14: 267-290. 1926.

9. Neuweiler, E. Das Auftreten des Kartoffelkrebses in der Schweiz im Jahre 1925. Landw. Jahrb. der Schweiz 40: 283-285. 1926.

10. Roach, W. A., and Wm. B. Brierley. The treatment of wart disease of potatoes with sulphur. Science n.s. 63: 307-308. Mar. 1926.

11. _____ Further experiments on the use of sulphur in relation to wart disease of potatoes. Ann. Appl. Biol. 13: 301-307. 1926.

12. Schlumberger, O. Fünf Jahre Reichskrebsprüfungen. Deutsche Landw. Presse 53 (1): 1. 1926.

POWDERY SCAB CAUSED BY SPONGOSPORA SUBTERRANEA (WALLR.) T. JOHNSON

The State of Washington is the only one reporting powdery scab in 1926. It was found by G. L. Zundel during July at Oysterville, Pacific County, where there was about 3 per cent infection in the field observed. Zundel thinks that the disease occurs rather generally in western Pacific County. A specimen of the disease was received from Oysterville, Washington, by the Bureau of Plant Industry August 30.

Powdery scab on potatoes from Scotland was intercepted by Federal Horticultural Board inspectors at Philadelphia in October, 1926.

Recent literature

1. Anon. Corky scab in potatoes. Gard. Chron. 3 (1783): 97, 98. 1921.

VIRUS DISEASES

The following references are given under this heading since they include work on the virus diseases in general rather than on any one specific disease. A number of workers have been conducting tests to determine the reduction in yield caused by various percentages of disease. In Maine, Folsom, Schultz, and Bonde (2) found that the yield of diseased plants was lower than that of the healthy plants by the following percentages:

Potato - Virus Diseases

	1924	1925
Spindle tuber	20%	25%
Mild mosaic	8-15%	25%
Rugose mosaic	50%	60%

In New Jersey, W. H. Martin (3) has worked out the following table based on his experiments which shows decrease in yield due to varying percentages of disease.

	10%	15%	20%
Mild mosaic	7 bus.	12 bus.	15 bus.
Spindle tuber	22 bus.	34 bus.	45 bus.
Rugose mosaic	23 bus.	35 bus.	46 bus.
Leafroll	27 bus.	41 bus.	54 bus.

Recent literature:

1. Folsom, D. Virus diseases of the potato. Ann. Rept. Quebec Soc. Prot. Plants 18: 14-29. 1926.

2. Folsom, D., E. S. Schultz, and R. Bonde. Potato degeneration diseases: natural spread and effect upon yield. Maine Agr. Exp. Sta. Bul. 331: 57-112. Mar. 1926.

3. Martin, W. H. Influence of degenerative diseases on yield. Hints Potato Grow. 7 (6): 1-4. Oct. 1926.

4. Morstatt, H. A. Entartung, altersschwäche und abbau bei kulturpflanzen, insbesondere der kartoffel. Freising-München, F. P. Datterer & cie., 1925 (Naturwissenschaft und landwirtschaft. h. 7)

5. Murphy, Paul A., and Robert McKay. Investigations on the leafroll and mosaic diseases of the potato. Jour. Dept. Lands & Agr. Ireland 26: 1-8. 1926.

6. _____ - _____ Methods for investigating the virus diseases of the potato, and some results obtained by their use. Scient. Proc. Royal Dublin Soc. 18 (14): 169-184. 1926.

7. Tompkins, C. M. Influence of the environment on potato mosaic symptoms. Phytopath. 16: 581-610. Sept. 1926.

MOSAIC (CAUSE UNDETERMINED)

Mosaic is widespread with susceptible varieties of potatoes throughout the United States. In 1926 it was reported as occurring in all states sending in reports. In prevalence it was either less than, or the same as, the average year. Oregon was the only state reporting it as more prevalent than usual. On the other hand Maryland, South Carolina, Louisiana, Wisconsin, and Idaho reported less than usual, and the same states together with New Hampshire reported less than last year. With the increased use of certified seed for commercial planting a gradual reduction in the amount of mosaic is undoubtedly taking place. Several collaborators mention this in their reports.

Mosaic is one of the most important potato diseases. The average loss for the United States during the past eight years has been 2.5 per cent. The losses in 1926 as estimated by state collaborators are given in table 64.

The situation in the various states can best be judged directly from some of the collaborator's reports.

Maine: An analysis of 119 fields taking into consideration all varieties showed that mosaic on the first inspection was only 1.8 per cent. The highest one in the lot was 8 per cent while there were several where the percentage was much less than 1 per cent. (E. L. Newdick).

New York: This disease appeared to be somewhat masked in July so that it was impossible to determine the amount of infection. Later observations indicate it to be as abundant as last year. It appears to be especially prevalent in Green Mountain fields of northeastern part of state. (Barrus)

(Long Island): Observed much more mosaic in certified seed this year than usual, some lots showed 40 and 50 per cent. Impossible, owing to scattered occurrence, to estimate loss. (Clayton)

New Jersey: Very common on Green Mountains. Some fields planted with certified seed showed 25 per cent infection. (Martin)

Maryland: Disease-free McCormick seed gave an increase of 200 bushels per acre over diseased seed. (Jehle & Temple)

Kentucky: About 15 per cent reduction of crop where non-certified seed were used in Jefferson County. (Gardner)

Tennessee: Mosaic conspicuous by its absence. The weather has been generally cool for season. More than the usual amount certified seed has been used. (Baskin)

Southern Georgia: Important in most garden plots since certified seed is rarely used in them. (Boyd)

Florida: Four per cent or less of the plants are affected. This is of a mild type as far as damage to the plant is concerned and the actual loss in yield is small. (Gratz)

Louisiana: The disease is general but much reduced in amount by use of certified seed from Montana and Nebraska. (Tims)

Texas: Quite prevalent on Irish potatoes in the lower Rio Grande Valley. Two per cent loss. (Taubenhaus)

Indiana: Serious in early crop. (Gardner)

Michigan: Trace in certified fields. Various types of mosaic observed, including mild, crinkle, rugose, and dwarf. (Kotila)

Mississippi: We have the mosaic and allied degeneration diseases in great abundance, but I regret that it is impossible to give reports on them this season. (Neal)

Wisconsin: Since the majority of potatoes belong to the Rural group the losses from mosaic are very minor. (Vaughan)

Missouri: Triumph, uncertified has 75 to 90 per cent infection; certified has 8 to 10 per cent infection. On other varieties it is slight. (Page & Archer)

Oregon: Rugose mosaic continues to be the chief destructive virus disease of potatoes in Oregon. In many fields a very high proportion of diseased plants is noted. (Barss)

Both mild and rugose mosaics gradually increasing each year. Effectively controlled by proper roguing in tuber unit seed plots and by eye indexing tubers. (McKay)

Varieties reported very resistant to mosaic in 1926 were the Ohio Rural and Burbank in Wisconsin. Varieties resistant were Rural in New York and Missouri, and Irish Cobbler in New York and Tennessee. Varieties susceptible were Green Mountain in New York, New Jersey, and Wisconsin, and Jersey Redskin in Maryland. Varieties reported very susceptible were Triumph in New York, Tennessee, Wisconsin, and Missouri; McCormick in Maryland; and Earliest of All and Idaho Rural in Oregon.

Recent literature

See also "Potato - Virus Diseases" page 246.

1. Tolaas, A. G. The production of mosaic-free Triumphs. Amer. Potato Jour. 3: 301-302. Sept. 1926.

Potato - Mosaic; Leaf Roll

Table 64. Percentage losses from mosaic of potato, as estimated by collaborators, 1926.

Percentage loss	States reporting	Percentage loss	States reporting
15	Arkansas, Montana	2.5	Kansas
13	Oregon	2	Ohio, Indiana, Iowa
10	New Hampshire, Georgia Louisiana, Washington	1	Texas, Michigan, Minnesota, North Dakota
8	Maryland, Idaho	.5	Connecticut
7	Kentucky	trace	Virginia, West Virginia,
5	Tennessee		South Carolina, Florida,
3.2	New Jersey		Wisconsin, Missouri,
3.	New York, North Carolina, California		Arizona

LEAF ROLL (CAUSE UNDETERMINED)

Leaf roll occurred widely over the country as usual. Of the thirty states reporting it New Jersey was the only one where it was mentioned as being more prevalent than usual, and in no state was it reported as being more prevalent than in 1925. The estimates of losses are given in table Some of the collaborators' reports are as follows:

Maine: Symptoms are distinct and outside of Aroostook it shows evidence of having spread in 1925 more than usual. (Folsom.)

New York: A larger percentage of affected plants occurs in western New York, particularly in the Northwest section and along Lake Ontario. Largely Burals grown there but it occurs in other varieties there as well. (Barrus)

(Long Island): This disease was important in a few fields most of which were planted with locally grown seed. In these cases leafroll varied from 40 to 90 per cent. (Clayton.

New Jersey: Present in every field of potatoes. Not severe in certified seed but very prevalent in non-certified seed. (Martin)

Virginia(Norfolk section): Leafroll is far more abundant than mosaic this season. As the season has been dry one must carefully distinguish between this disease and Fusarium or physiological wilt. The above statement is made with this fact in mind. Typical leafroll is too abundant in plants from all sources. The percentage is especially high for New Jersey and New York seed. Three to ten per cent is estimated for the crop in general. (McWhorter)

Georgia: Occurs in most all city and farm gardens where there is little certified seed used. (Boyd)

Florida: Trace; loss negligible. (Gratz)

Louisiana: Present but not important. (Tims)

Arkansas: Conditions in early part of season made it possible to distinguish leaf roll. (Dept. Pl. Path.)

Ohio: Present in practically all plantings where disease-free seed has not been used. Leaf roll plants yield 40 to 60 per cent as much as healthy plants. (Tilford)

Indiana: Most important disease. (Gardner)

Michigan: Most fields of certified stock show only trace. Abundant in fields planted with commercial stock. Twenty-eight per cent observed in field of Russet Burbank, 96 per cent in garden patch of mixed varieties. (Kotila)

Oregon: Disease increasing rapidly in some places. Not abundant yet over whole state. Effectively controlled by proper roguing in tuber unit plots and by eye indexing tubers. (McKay)

No varieties were mentioned as resistant to leaf roll, on the other hand most of them seem to be susceptible. The Triumph in New York and the Netted Gem in Idaho were listed as especially susceptible.

Schweizer (6) reports disappearance of symptoms of leaf roll in plants injected with albumen and pepsin. Leaves on older portion of plant unrolled and appeared normal and new growth was free from phloem necrosis.

Recent literature - See also "Virus Diseases" page 246.

1. Esmarch, F. Blattrollkrankheit oder nicht? Sachs. Landw. Zeitschr. 74: 543-545. Aug. 1926.

2. _____ Das Blattrollen der Kartoffel. Kranke Pflanze. 3: 143-146. Aug. 1926.

3. Ludewig, K. Beiträge zum Studium der Blattrollkrankheit der Kartoffel. (Contributions to the study of the leaf roll disease of the potato.) Landw. Jahrb. 63 (2): 277-303. 1926.

4. McLean, W. The control of leaf roll disease in potatoes by the diagnosis of "primarily infected" tubers. Jour. Agr. Sci. 16: 149-157. Jan. 1926.

5. McLean, W. Effect of leaf roll disease in potatoes on the composition of the tuber and "mother tuber." Jour. Agr. Sci. 16: 318-324. Apr. 1926.

6. Schweizer, G. Zur Blattrollkrankheit der Kartoffelpflanze. Ber. Deut. Bot. Ges. 44: 551-561. Dec. 1926.

Table 65. Percentage losses from leaf roll of potato, as estimated by collaborators, 1926.

Percentage loss	States reporting	Percentage loss	States reporting
8	California	2	Maryland, Georgia, Idaho, Washington
7	Kentucky	1	North Carolina, Michigan,
6	Oregon	.5	Connecticut, Delaware, Montana
5.5	New Jersey	trace	West Virginia, Louisiana, Minnesota, North Dakota, South Dakota, Arizona
5	New Hampshire, Ohio		
4	Indiana		
3	New York, Arkansas		

SPINDLE TUBER (CAUSE UNDETERMINED)

It is only of recent years that spindle tuber has come to be recognized as one of the important potato diseases. The tendency of strains of potato tubers to become elongated has long been recognized as one of the symptoms of "running out", but it was not until 1922 and 1923 that spindle tuber, or marginal leaf roll, was reported in the literature as a definite transmissible disease. Since that time it has been recognized as occurring widely. In his recent treatise on this disease Werner (3) of Nebraska makes the statement that "it is apparently generally distributed through all the commercial potato growing sections of the United States." It has been reported to the Plant Disease Survey from 19 widely scattered states and probably occurs in many others but has not been recognized and reported.

In 1926 it was reported to the Plant Disease Survey for the first time from the states of New Hampshire, Missouri, Arkansas, and Kansas. In New Hampshire it was observed locally, infecting 5 per cent of the plants in some fields, and in Kansas 2 per cent reduction in yield was estimated on account of it.

In New York it was thought to be less prevalent than usual and was reported to be of slight importance, causing not over a trace of loss. In New Jersey, however, an estimate of 1.8 per cent reduction in yield was made, while 15 per cent infection was observed in some fields. In Nebraska, R. W. Goss reported it as very important, occurring generally in about the same amounts as usual. Some of the collaborators' reports are as follows:

New York: Found in varying amounts up to 6 per cent in Nassau County. Probably less than 2 per cent spindle tuber plants in state, possibly less than 1 per cent. (Barrus)

New Jersey: Very little spindle tuber in fields planted with certified seed. Some non-certified seed showed considerable amount. (Martin)

Florida: Four to five per cent of the plants are affected. The tubers from these hills are typically long, cylindrical, and spindly, many of which drop through the prime chain on the grader into the seconds. With high prices this is a serious loss. Spindle tuber symptoms are apparently worse in the southern part of the state. The same strain of potatoes planted in the Hastings belt produced but from one third to one half the percentage of spindle tubers as when planted in the Belle Glade section. (Gratz)

Arkansas: Quite prevalent on Bliss Triumph. (Rosen)

Missouri: Severe on Irish Cobbler; also on Early Ohio variety. The use of certified seed eliminates the disease. (Page)

Nebraska: Probably the most serious disease in Nebraska..... Spindle tuber has been the leading factor causing fields to be rejected for certification during the last few seasons. However, the certified stock is showing a constant annual decrease in spindle tuber content as a result of a general roguing and seed selection campaign. (Werner (3)

Kansas: A large amount of spindle tuber is showing up in our fields, especially in uncertified seed stock. Some such stocks ran as high as 10 per cent spindle tuber. Certified stock is much better in this respect and absence of spindle tuber in certified seed stock will be a big factor in convincing Kaw Valley growers that certified stock is what they must have for best returns. (White)

The control of spindle tuber is much the same as with the other virus diseases such as mosaic and leaf roll. Roguing and the growing of the seed stock in isolated plots has been found to be effective. The tuber index method according to Werner (3) has not been demonstrated as very effective on account of difficulty of recognizing symptoms under winter greenhouse conditions. No instance of resistant or immune varieties has been reported.

Recent literature

1. Goss, R. W. Transmission of potato spindle tuber disease by cutting knives and seed piece contact. (Abstract) Phytopath. 16: 68-69. 1926.

2. _____ Transmission of potato spindle tuber by cutting knives and seed piece contact. Phytopath. 16: 299-303. 1926.

3. Werner, H. O. The spindle tuber disease as a factor in seed potato production. Nebraska Agr. Exp. Sta. Res. Bul. 32: 1-128. 1926.

4. Werner, H. O. Spindle tuber - the cause of "run out" potatoes. In Ann. Rep. Nebraska Potato Improvem. Assoc. Ann. Rep. Nebraska State Bd. Agr. 1925: 719-741. 1926.

WITCHES' BROOM (CAUSE UNDETERMINED)

Witches' broom has been reported most frequently since 1923 from the northwestern states of Montana, Idaho, Washington, and Oregon. It has also been recorded at various times from British Columbia in Canada. It is in this general area that the disease seems to be of most importance.

What may be this same trouble was reported to the Plant Disease Survey as occurring in Michigan on a planting of imported Rural Russet seed in 1915. The symptoms of the disease as it occurred in Michigan at that time seemed to agree with those manifested in the Northwest. From Maine also a disease called "yellow top" and answering somewhat to the description of witches' broom has been reported. Bisby and Tolaas (1) in their bulletin on potato diseases mention witches' broom, stating that it occurs rarely and may be similar to spindling sprout. The Canadian Plant Disease Survey has also reported witches' broom from Canada in 1924.

In 1926 it was said to be much less prevalent than usual and was only of slight importance in Idaho, according to C. W. Hungerford. In Washington one field of 30 acres was reported in the Pasco region which showed 100 per cent infection. The crop was an entire loss. From the general standpoint, however, the disease was said to be of minor importance in Washington. In Oregon it was reported as being present in about the same amounts as usual, causing about 1% reduction in yield and being more prevalent in eastern Oregon than in the western part of the state. As high as 10 per cent infection was noted in at least one field.

Young and Morris (3) have recently reported artificial transmission of witches' broom from one plant to another by means of cork borer plug inoculations, and by inarch and side grafting.

Recent literature

1. Bisby, G. R. and A. G. Tolaas. Potato Diseases in Minnesota. Minnesota Agr. Ex. Sta. Bul. 190: 1-44. June 1920.

2. McLarty, H. R. Witches' broom of potatoes. Scient. Agr. 6: 395. July 1926.

3. Young, P. A. and H. E. Morris. Potato witches' broom is a transmissible disease. Pl. Dis. Reptr. 10: 26-28. July 15, 1926.

OTHER VIRUS DISEASES

Streak

Maryland and Missouri were the only states reporting streak to the Survey in 1926. In Maryland, R. A. Jehle reported more than usual and said that a trace could be found in almost all Irish Cobbler fields inspected. The largest amount found in any one field was 2 per cent. In Missouri, E. M. Page reported it to be of slight importance.

Yellow dwarf

Whether or not this disease, originally reported from New York, will eventually prove to be a virus disease is a question but tentatively it is so classified. From New York, M. F. Farrus reports that it was more prevalent than last year or the average year although in general it was scattered and of slight importance. He states that there is an indication that the use of disease-free seed and roguing keeps the disease in check. In New Jersey it was observed only in tuber unit plots planted with seed received recently from New York. It was not found in commercial plantings. A few plants of what were suspected of being yellow dwarf were noticed by McKnorter in Virginia and Tilford in Ohio occurring on plants from New York State seed. These cannot be considered as definite reports, however, as specimens have not been received nor the basis of determination given.

Giant hill

Connecticut and Oregon reported giant hill. In Oregon, according to McKay, it is seemingly of increasing importance and the chief loss is because of poorly shaped tubers. As high as 5 per cent infection was observed in some fields and the estimated loss for the state largely on account of loss in grade was placed at 1 per cent plus. All varieties noted in Oregon were susceptible.

TIPBURN AND HOPPERBURN

More leafhopper injury than usual was reported by collaborators of the various states in 1926.

It is probable that tipburn and hopperburn taken together cause more loss on the average than any single potato disease. Late blight causes heavy losses during some years but the average loss over a period of years seems to be less than that from tipburn and hopperburn. The average estimate of reduction in yield for the past eight years has been 3.68 per cent for these diseases, whereas, late blight has only averaged slightly over 3 per cent, mosaic about 2.5 per cent, and leaf roll about 2 per cent.

The percentage losses for 1926 are high in some states as will be seen from the accompanying table 67.

From the following collaborators' reports it will be observed that an increasing amount of evidence is accumulating to show that leaf hoppers are important factors in the bringing about of foliage burning which for many years was considered purely physiological.

Potato - Tipburn and Hopperburn

New Hampshire: In the greater part of the state the year was too dry for best growth of potatoes and tipburn caused considerable damage. (Butler)

New York: Some fields that were well sprayed gave indication of marked control. (Barrus)

New Jersey: Hopperburn is one of the most serious troubles of the potato in New Jersey. Where Bordeaux is not used the vines are killed early with resulting yield decrease. Copper-lime dust failed to control hopperburn. In one spray test the yield of the check plots was 269.9 bushels per acre, sprayed six times with 5-5-50 Bordeaux 316.0, and dusted with copper-lime dust 284 bushels. In another test, on Irish Cobbler, on July 15, 79 per cent of leaves were dead on plots sprayed with arsenate of lead and 24 per cent where four applications of Bordeaux were made. Spraying with Bordeaux is being generally adopted by central and south Jersey growers, the former reporting an average yield increase of 50 bushels this year, mostly from control of leaf hoppers. (Martin)

Pennsylvania: The severe damage was noted especially upon Cobblers early in July. (Beach)

Arkansas: Extremely prevalent this year. As there has been considerable rainfall where this injury has been observed, and as leaf hoppers were very common, there is little doubt that the injury was due to the hoppers and not to any lack of moisture. (Rosen)

Ohio: Hopperburn is our most important potato disease. It has been controlled the past two years satisfactorily with a fresh mixed copper-lime dust. (Tilford)

Michigan: Severe on unsprayed early planted potatoes in lower Michigan. Hot weather during first half of July a factor responsible for rapid multiplication of hoppers. Cold June and wet July in Upper Peninsula conditions unfavorable for hoppers. Hopperburn will not be a serious factor in that part of state. (Kotila)

South Dakota: Very prevalent. (Evans)

Washington: The hot weather has surely caused a large amount of tipburn in the potato fields of Walla Walla. (Zundel)

Table 67. Percentage losses from tipburn and hopperburn of potato, as estimated by collaborators, 1926.

Percentage loss	States reporting	Percentage loss	States reporting
25	Delaware, West Virginia	2.8	North Carolina
		2	New York
15	Minnesota	1.5	North Dakota
10	South Dakota, Kentucky	1	Maryland, Texas
		.5	Connecticut
7	New Jersey, Ohio	trace	Wisconsin, Missouri,
6	Arizona		Kansas, Louisiana
5	New Hampshire, Virginia, Tennessee, Arkansas		

Recent literature

1. Dudley, J. E., Jr. The potato leafhopper and how to control it. U. S. Dept. Agr. Farm. Bul. 1462: 2-13. 1926.

OTHER DISEASES

Bacillus carotovorous Jones and related species, soft rot. This disease is always more or less common and troublesome in shipments of potatoes. It often follows injury from other causes such as over-heating in field or car, freezing injury, late blight rot, etc. Only two collaborators mention this disease in their annual reports. W. H. Martin of New Jersey mentions its being found on seed pieces in one field April 9, and C. T. Gregory reports much more of it this year than usual in Indiana where it occurred locally following heavy rains in August and September. He estimates 5 per cent loss in storage and in transit on account of it.

Caconema radicicola (Greef) Cobb, (Heterodera radicicola) rootknot. Reported as prevalent in Texas causing one-half of one per cent loss. Milbrath also reports it as rather serious in California.

Phymatotrichum omnivorum (Shear) Dug. root rot. The first record of Ozonium root rot on the Irish potato was received from J. J. Taubenhaus June 15. He states that the disease was found in the lower Rio Grande Valley around San Benito where it was destroying from 4 to 10 per cent of the crop in that section. Many different hosts for this fungus have been reported in the past, but this is the first year that the Irish potato has been recorded as such.

Sclerotium rolfsii Sacc., stemrot. South Carolina, Mississippi, and Texas report this disease of potato. In South Carolina, W. D. Moore reported a very severe case on May 8 near Sheldon in a 40-acre field of Green Mountains. By June 8 over 50 per cent of the plants in the field were destroyed. Irish Cobbler is grown in the same section but the disease was not observed on that variety. On July 15, C. A. Ludwig wrote that the Horticultural Division of the

Experiment Station in South Carolina reported a case at Summerville. Other cases of this fungus on potato in South Carolina are (1) a mild attack in Thurston County in June 1922 and (2) a slight attack in Spartanburg County in the same year. In Mississippi a trace of the disease was observed June 9 in Clark County, and in Texas definite reports were received from three counties.

Spondylocladium atrovirens C. O. Harz, silver scurf. In New Jersey it was said to be present on the commercial and late crop but most severe on the latter. The disease also occurred in western Washington. This trouble is generally distributed and doubtless occurred in most states, but for various reasons collaborators failed to report it.

Tylenchus dipsaci (Kuehn) Bast., stem nematode. This nematode has never been reported on potatoes in the United States so far as is known; however, in England, according to Hodson (13), the potato is reported in recent years as a common host. He says "The attack on the potato is probably unique for the tubers only are attacked, the haulm above ground being free and presenting a normal appearance." In regions where this nematode occurs it would be well to watch out for possible infestation of potato tubers.

Black heart (non-par.) Although this disease occurs widely wherever potatoes are subjected to over-heating in storage, it was only reported in 1926 to the Survey from California and Texas.

Heat necrosis. California. Estimated loss 8 per cent. (Milbrath)

Internal brown spot (non-par.) A specimen of this trouble was received by the Office of Vegetable and Forage Diseases, Bureau of Plant Industry, from Mississippi, July 3, and collaborators in Washington and California reported its occurrence. In Washington it was noted on potatoes of the 1925 crop in four widely separated regions. The losses, however, were small. In California the loss from internal browning, as it was called by Milbrath, was reported as 5 per cent. Atanasoff (6) showed that internal brown spot or sprain is transmissible through tuber grafts, and believes it to be caused by living organism, which enter the tuber from without. It is not seed transmitted and is not caused by environment.

Net necrosis (undet.) Estimated loss in California according to Milbrath is 0.5 per cent. Atanasoff (5) has reported that "Net necrosis is a tuber symptom, not of leaf roll, but of Aucuba mosaic."

Seed piece decay. In western Washington there was considerable decaying of seed pieces following cold rains in May according to Zundel. Very few fields planted in that month had over 35 per cent of a stand except where whole potatoes were used. Also, according to Zundel, in the Yakima Valley and in Washington in general the stand was not up to normal. The Department of Plant Pathology, Washington Experiment Station, reports as follows concerning this.

> "Some trouble is experienced each year from rotting of seed pieces after planting. In some cases this is traceable to improper handling of stock after cutting. Heating in sacks and lack of attention to drying cut seed after cutting are factors affecting germination and vitality of young plants. This trouble is reported from scattered localities each season."

Spindling sprout. In Michigan J. E. Kotila reported spindling sprout causing 5 per cent loss in a field of Rural Russets. This disease was said to be distinguishable from witches' broom.

Potato - Other Diseases; Literature.

Sprout tubers (undet.) Potato seed pieces which produce small tubers rather than aerial stems were reported from North Carolina April 20 by G. W. Fant and from Michigan August 1 by J. E. Kotila. Weakness due to prolonged storage under warm conditions is suggested as a cause by Kotila.

Stem-end browning (undet.) New York - "Very little reported this year. That which was reported may have been due to pathogens or to environment." (Barrus)

Stem-end rot (associated with drought conditions and various Fusaria). Much more of this rot was reported than usual from California, according to W. T. Horne. In Humboldt County where it occurred it was a very dry year which possibly accounted for the damage. White Mountain and Multnomah varieties were reported by Horne as susceptible, whereas British Queen seemed to be immune.

Recent literature on potato diseases

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2. Appel, O. Gelbfleckigkeit der Kartoffelstauden. (Mottling of potato plants.) Deutsch. Landw. Presse 53: 209. 1926.

3. Appel, O. Taschenatlas der Kartoffelkrankheiten. 2. Staudenkrankheiten. Berlin, P. Parey, 1926. (Parey's Taschenatlanten nr. 2).

4. Atanasoff, D. The stipple streak disease of potato. A complex problem. Izv. Bulg. Bot. Druzh. (Bul. Soc. Bulgarie) 1: 43-52. 1926.

5. _____ Net necrosis of potato. Phytopath. 16: 929-940. Dec. 1926.

6. _____ Sprain or internal brown spot of potatoes. Phytopath. 16: 711-722. Oct. 1926.

7. Barrus, M. F., and C. Chupp. Potato diseases and their control. Bul. Cornell Univ. Coll. Agr. Ext. Serv. 135: 1-123. Mar. 1926.

8. Berridge, Emily M. Studies in bacteriosis. XIV. Chemical agglutination as a means of differentiating bacterial species causing soft rot of potatoes and other vegetables. Ann. Appl. Biol. 13: 12-18. 1926.

9. Bolley, H. L. (Plant disease investigations). North Dakota Agr. Exp. Sta. Bul. 194: 40-50. 1926.

10. Davis, W. L. Physiological investigation of black heart of potato tuber. Bot. Gaz. 81: 323-338. 1926.

11. Dickson, B. T. The black dot disease of potato. Phytopath. 16: 23-40. 1926.

12. Goss, R. W. Nebraska potato diseases. In Ann. Rept. Nebraska Potato Improvem. Assoc. Ann. Rept. Nebraska State Bd. Agr. 1925: 764-767. 1926.

13. Hodson, W. E. Notes on the stem eelworm. Jour. Min. Agr. Great Britain 33: 259-262. June 1926.

14. Lacey, Margaret S. Studies in bacteriosis. XIII. A soft rot of potato tubers due to Bacillus carotovorus and a comparison of the cultural, pathological and serological behaviour of various organisms causing soft rots. Ann. of Appl. Biol. 13 (1):1-11. 1926.

15. MacMillan, H. G. Irrigation and diseases. Amer. Potato Jour. 3: 198-201. June 1926.

16. Millard, W. A. Internal rust spot of potatoes. Nature 118: 804. Dec. 1926.

17. Moore, H. C. Some studies in hollow heart of potatoes. Proc. Potato Assoc. Amer. 12: 41-46. 1926.

18. _____ Hollow heart of potatoes. Michigan Sta. Quart. bul. 8 (3): 114-118. 1926.

19. Naoumoff, N. A. Some new or little known species. Morbi Plantarum, Leningrad 14: 137-149. 1926.

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22. Racicot, H. N. A spotting and shrinking of potatoes in storage. Ann. Rept. Quebec Soc. Prot. Plants 18: 55-56. 1926.

23. Schwarz, Marie B. De roestvlekkenziekte van aardappelknollen in Nederlandsch Oost-Indie. Tijdschr. Plantenz. 32: 321-330. Dec. 1926.

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DISEASES OF TOMATO

FUSARIUM WILT CAUSED BY FUSARIUM LYCOPERSICI SACC.

Fusarium wilt was reported from most states east of Kansas. In the northern tier of states such as Minnesota, Wisconsin, Michigan, and Pennsylvania the small amount that was reported occurred mostly in greenhouses.

In prevalence wilt was apparently about the same as usual. Of the 18 states reporting on prevalence, 13 reported the usual amount, 4 reported less, and 1 more than the average.

The losses as estimated by collaborators are given in the following table 68.

Table 68 . Percentage losses from Fusarium wilt of tomato, as estimated by collaborators, 1926.

Percentage loss	States reporting	Percentage loss	States reporting
20	Louisiana	3	Virginia
15	South Carolina	2	Texas, Indiana
10	Tennessee, Alabama, Mississippi, Arkansas, Kansas	1	Ohio
		0.3	California
		trace	New York, Delaware, West Virginia, Michigan, Wisconsin, Minnesota, Iowa, North Dakota
6	North Carolina		
5	Missouri		
4.5	New Jersey		
4	Maryland, Georgia, Mississippi		

The following collaborators' reports are of particular interest.

New Jersey: Seedlings sent in from Gloucester May 8 were wilted. Isolations yielded an organism that looked like Fusarium lycopersici. (Dept. Pl. Path.)

Maryland: Losses gradually decreasing due to the use of resistant varieties. (Norton & Jehle)

Virginia: Wilt seems to be the most common tomato disease of the season. (Fromme)

North Carolina: Severe in many town gardens when wilt resistant varieties are not used. (Fant)

South Carolina: Wilt has limited tomato growing throughout state. Many farmers have had to abandon tomatoes on account of wilt in conjunction with rootknot. (Moore)

Southern Georgia: Generally worse in small home gardens than in fields and worse in second crop than in spring crop. A 400-acre planting of Globe in Coffee County showed about 1 per cent. (Boyd)

Florida: The most serious disease with tomatoes this year, there being very few fields in which at least 35 per cent of the plants were not affected more or less seriously. There are cases where wilt may be found on 80 to 95 per cent of the plants. (Kelbert, D.G.A. May 26)

Alabama: Very general in home gardens. (Miles)

Arkansas: Twenty to 30 per cent count made in three fields around Fayetteville on non-resistant varieties. (Rosen)

Indiana: Much of this year's wilt could be traced to southern grown plants of this year or last year, when the state was flooded with imported plants. (Gardner)

Much work has been done on the development of resistant varieties during recent years. During 1926 four collaborators have reported to the Survey on this subject. In Kansas, White (3) has reported that the following six varieties have proved to be resistant, commercially desirable, and climatically adapted to Kansas - Louisiana Red, Louisiana Pink, Marvel, Norton, Norduke, Marvana, and Kanora. Tims, of Louisiana, reports the first two very resistant in that state. McClintock in Tennessee mentions Tennessee Beauty and Marglobe as very resistant and the Globe as resistant. E. M. Page of Missouri reports Globe and New Century resistant.

I. T. Scott (2), of Missouri, found that three to four tons of lime per acre thoroughly incorporated with the soil to a depth of nine inches reduced losses from wilt. It is necessary to incorporate the lime deep in the soil in order to have any beneficial effect.

Recent literature

1. Essary, S. H. Two important tomato diseases and their control. Tennessee Agr. Exp. Sta. Circ. 8: 1-4. Jan. 1927.

2. Robbins, W. J. Botany. In Report of the Director, July 1, 1924, to June 30, 1925 - Missouri Agr. Exp. Sta. Bul. 236: 44-45. 1926.

3. White, R. P. Tomato wilt investigations. Kansas Agr. Exp. Sta. Tech. Bul. 20: 4-32. 1926.

LEAFSPOT CAUSED BY SEPTORIA LYCOPERSICI SPEG.

Of the 28 states reporting Septoria leafspot only one, Iowa, reported more than usual. The others all reported either less than or the same as the average year. This was probably due to comparatively cool early summer temperatures coupled with a deficiency of rainfall which retarded and inhibited the development of the fungus. The accompanying table 69 shows the relative prevalence of the disease as reported from various states as well as the estimates of loss.

Tomato - Leafspot

Table 69 . . Estimated average percentage loss from and relative prevalence of leafspot of tomato in 1926, as reported by collaborators.

State	Estimated percentage loss 1926	Prevalence compared with 1925	Prevalence compared with Average year	State	Estimated percentage loss 1926	Prevalence compared with 1925	Prevalence compared with Average year
Iowa	12	more	more	Mo.	2	more	same
N. J.	8	more	same	Conn.	1	more	same
Mi.	5	much less	much less	Va.	1	less	less
Wisc.	5	same	same	W. Va.	1	----	----
Ga.	4	more	same	S. Dak.	1	same	same
Mich.	3	less	less	Ala.	0.5	----	----
Kans.	3	same	same	N. Y.	trace	same	same
Del.	2	less	less	Pa.	trace	less	same
N. Car.	2	----	----	S. Car.	trace	less	less
Texas	2	----	----	Miss.	trace	----	----
Indiana	2	less	same	Minn.	trace	same	----

The following collaborators' reports are of interest:

New York: In general of minor importance in the canning districts. On account of the dry summer it did not become established until August 1 or after. A few fields were heavily defoliated where rotation of crops was not followed. (Jones)

New Jersey: In many fields the Bonny Best and other second earlies are almost completely defoliated as the result of the presence of Septoria leafspot. The Marglobe variety is apparently much more resistant to this disease than are the varieties commonly grown. The Marglobe has yielded well and the fruit has good size and color. (Dept. Pl. Path.)

Maryland: Very much less than usual, probably due to dry weather during the early part of the season. To September 1 none observed south of Kent County. More observed in the northern and western part of the state than in the southern and eastern parts. (Norton & Jehle)

Missouri: Damage moderate. General. Especially troublesome in cannery district, i. e., Ozarks. (Page)

Porto Rico: Common and sometimes severe, especially in seed beds. (Cook)

Recent literature

1. Anon. Tomato leafspot New Jersey Agr. Exp. Sta. Circ. 193: 1-2. 1926.

2. Essary, S. H. Two important tomato diseases and their control. Tennessee Agr. Exp. Sta. Circ. 8: 1-4. Jan. 1927.

3. Pritchard, F. J. Control of tomato blights. Canning Trade 49 (22): 50, 52, 54, 56, 60, 62. Jan. 17, 1927; (23): 18, 20, 22. Jan. 24, 1927.

EARLY BLIGHT CAUSED BY ALTERNARIA SOLANI (ELL. & MART.) JONES & GROUT

This disease was reported from most of the Eastern and Southern States principally as a leaf blight, although in Florida and some of the other southern States the nailhead spot phase was most common, while in New York a rot of the fruit following growth cracks, and in other states collar rot, were reported.

Several states reported more than usual. This may have been on account of cool temperatures, which, according to Pritchard (2), favor early blight. The disease seemed to be more prevalent than usual in the Delaware, Maryland, and Virginia section and, as will be seen from the accompanying table, heavy losses occurred there.

Table 70. Percentage losses from early blight of tomato, as estimated by collaborators, 1926.

Percentage loss	States reporting	Percentage loss	States reporting
10	Georgia	1	New Jersey, West Virginia, Florida, South Dakota
6	Maryland		
5	Delaware, Virginia, Louisiana	trace	New York, North Carolina, South Carolina, Arkansas, Michigan, Wisconsin, Minnesota, Missouri, California
3	Indiana		
2	Mississippi		
1.5	Texas		

F. P. McWhorter, of the Virginia Truck Experiment Station, reports in addition to the leafspot and collar rot form of the disease, a dropping of the fruit which he thinks may be caused by this fungus.

Some of the collaborators' reports are as follows:

New York: Of minor importance in causing defoliation but appears to be causing considerable damage as a rot in cracked fruit in the canning districts. (L. K. Jones)

Delaware: Very prevalent with early and late crops. Heavy rains cut yield of canning crop. (Adams)

Tomato - Early Blight

Maryland: Much more prevalent than usual. This disease in combination with weather conditions caused a loss of 80 to 90 per cent of the foliage during August. This disease practically replaced the usual Septoria leafspot. (Norton & Jehle)

Georgia: First observed in cold frame March 28; in field April 7, Ambrose, Georgia. An epidemic of both early blight and Septoria spot destroyed 50 per cent of the plants in two large beds under glass, April 1. (Boyd)

Florida: This disease has not been as prevalent this season as last year. In only three or four instances have fields been severely infected. The disease made a very late appearance on the large vines, none being found on the fruit until the latter part of March. Although this disease was rather serious in seed beds it appears that the older leaves dropped off of the seedlings after they were set in the field. Thus little or no disease was found in the older plants until the middle of April. A more rapid spread of the disease was noticed after warm weather and fogs at night as compared with the cold spring. (D.G.A. Kelbert)

Alabama: Leaf blight severe in southern section of state. Nailhead spot more serious in the interior parts. Latter form important locally. Loss conservatively estimated at 2 per cent for the state. (Miles)

Mississippi: Very severe on the early tomatoes, especially in the leaf spot form. (Wedgworth)

Arkansas: Noted in unusual abundance on early varieties, many plants almost completely defoliated. Dry weather in August checked the disease very considerably. (Rosen)

Nailhead spot is an important disease in the tomato section of western Mexico, according to A. W. Morrill, who reported as follows (Jan. 13, 1927):

"There seem to be two types of nailhead spot present on tomato in western Mexico, both of which were unusually destructive in 1926 in the Fuerte Valley, State of Sinaloa. The damage probably amounted to at least one million dollars in the Fuerte Valley alone, where 22,000 acres of tomatoes are grown. There was also considerable of the disease further south. Excessive rainfall late in December was probably one of the most important contributing causes."

Good control with copper-lime dust (25 per cent monohydric copper sulfate) was reported by Gardner and Kendrick of Indiana. Six applications with a knapsack bellows duster gave 20 to 70 per cent increase in yield.

Tomato - Early Blight; Western Yellow Blight

Pritchard (1) recommends for control of this disease and also for the Septoria leafspot: 1- seed treatment with mercury bichloride 1-3000 for 5 minutes followed by washing in fresh water from 10 to 15 minutes; 2- clean seed beds; 3- the use of early plants; 4- crop rotation; 5- spraying and dusting; 6- deep fall plowing and 7- clean culture. He stresses the desirability of plowing under old tomato vines in the fall.

Recent literature

1. Pritchard, F. J. Control of tomato blights. Canning Trade 49 (22): 50, 52, 54, 56, 60, 62. Jan. 17; (23): 18, 20, 22. Jan. 24, 1927.

2. Ramsey, G. B. and Alice A. Bailey. The development of nailhead spot of tomatoes during transit. (Abstract) Phytopath. 17: 43-44, Jan. 1927.

WESTERN YELLOW BLIGHT (CAUSE UNDETERMINED)

Much more western yellow blight than usual occurred in the Pacific Northwest, where the losses were extremely high, Washington and Oregon each reporting 90 per cent of the crop lost and Idaho reporting 50 per cent loss. It was also very destructive in California and Arizona. In the latter state a total loss of 25 per cent was estimated, with as high as 95 per cent loss in some fields. Other Rocky Mountain States where the disease sometimes occurs were not heard from.

The following collaborators' reports give further details concerning the situation:

Washington: The western blight of tomato is extremely prevalent in the state this year. As an example: The forecast of the yield of tomatoes in the Walla Walla section was 100 cars, but the blight has done such a good job that they will not have over two or three cars to ship. During my recent visits in western Washington, it was not uncommon for the farmers to take me to their tomato patches and show me where from 50 to 95 per cent of the plants had been killed. The damage done by this disease is the greatest that I have known in the nine years I have been in the state. (Zundel)

Oregon: Worst year in history. Tomato areas such as Milton-Freewater and The Dalles suffered all but total loss. Five per cent crop reported in many places. (McKay)

California: The southern part of the San Joaquin Valley has suffered the most, as usual. Unprotected fields in the Shafter section were affected to the extent of about 100 per cent, and in the Bakersfield section up to 80 to 90 per cent.

The average loss at Merced was not in excess of 20 to 25 per cent. The Sacramento district, where the disease was extremely severe last year, showed on the average not more than 5 per cent by the middle of July, as against some 80 to 90 per cent last year. The peninsula in the San Francisco Bay region is practically free from blight. An unusual amount of the disease, up to 60 per cent, has developed in canyons along the coast between San Diego and Santa Ana. The greatest damage there appeared during the month of June, coinciding with the period of dry and hot weather. The amount of blight in the Riverside section is extremely variable, from almost nothing to 60 per cent. Lighter soils as a rule have the greatest amount. (Shapovalov)

Arizona: Growers report that this is the worst year for yellow blight in their experience. Seventy-five per cent of the fields are a total failure in the Verde Valley. Of more than a dozen fields examined within the past week, none have better than a 50 per cent stand. One field of one-half acre had only four healthy plants remaining. Plants seeded in the field have been attacked in about the same severity as those transplanted. Shading the plants by interplanting with corn has had little beneficial effect. (Brisley)

McKay and Dykstra (2) have recently shown that this disease is caused by the same virus that is responsible for the curly top of the sugar beet and other plants - a very important step in the solution of this problem. They point out that the occurrence of this disease is correlated with that of the curly top of sugar beets. A comparison of figures 23 and 24, giving the distribution of yellow blight and of curly top, shows that they are more or less coincidant, and an examination of survey records concerning the prevalence of these two diseases in the same year also shows correlation in many cases.

Recent literature

1. Lesley, J. W. A study of resistance to western yellow blight of tomato varieties. Hilgardia 2: 47-66. Sept. 1926.

2. McKay, M. B., and T. P. Dykstra. Sugar beet curly top virus, the cause of western yellow tomato blight. (Abstract) Phytopath. 17: 39. Jan. 1927.

3. Shapovalov, M., and F. S. Beecher. Menace of western yellow blight. Pacific Rural Press 111: 365, 371. March, 1926.

Figure 23 ...

Distribution of western yellow blight of tomato as reported to the Plant Disease Survey.

Each dot represents a year in which the disease was definitely reported from a county.

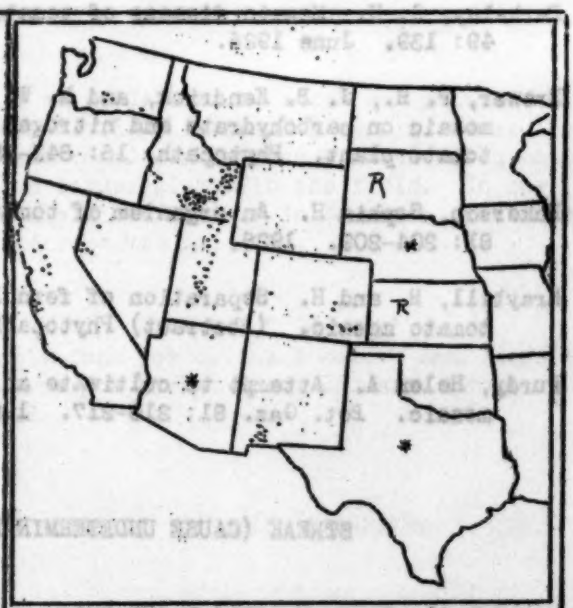

Figure 24.

Distribution of curly top of sugar beet as reported to the Plant Disease Survey.

Dots - See above.

R = Disease reported; location not given.

* = Recorded in literature.

MOSAIC, CAUSE UNDETERMINED

Mosaic was reported from practically every state sending in reports on vegetable diseases. It seems to have been generally distributed both in greenhouses and in the field. Most reports indicated average or less than average prevalence, however, New Jersey, Maryland, Virginia, Arkansas, Iowa, and Kansas reported more than usual. The losses estimated by collaborators were: Louisiana, 15 per cent; Pennsylvania, 10 per cent; New Jersey and Maryland, 5 per cent; Iowa, 4 per cent; Kansas, 2 per cent; Virginia, 1 per cent; California, 0.5 per cent. In Delaware, Adams reported it as generally found in home plantings but not important in commercial fields. In Florida, Kelbert reported heavy infection of the crop but not much actual damage since tomatoes were affected late, in most instances after the vines had matured fruit of good size; however, certain fields were attacked early with considerable damage resulting. In Illinois, G. A. Meckstroth noted light general infection in a field of canning tomatoes, but as the fruit was heavily set the plants made a good yield in spite of the disease. In Michigan, it was said to be very important on greenhouse crops at Grand Rapids and some cases of from 50 to 75 per cent infection were observed. In Nebraska from traces to 100 per cent infection were reported but the loss in the largest commercial sections was not severe. In Oregon 20 per cent infection was noted in one greenhouse near Eugene. In Porto Rico, Mel T. Cook states that the disease is common but its importance is not established.

Recent literature

1. Berkeley, G. H. Mosaic disease of tomatoes. Canad. Hort. 49: 139. June 1926.

2. Brewer, P. H., J. B. Kendrick, and M. W. Gardner. Effect of mosaic on carbohydrate and nitrogen content of the tomato plant. Phytopath. 16: 843-851. Nov. 1926.

3. Eckerson, Sophia H. An organism of tomato mosaic. Bot. Gaz. 81: 204-209. 1926.

4. Kraybill, R. and H. Separation of fern leaf from mottling in tomato mosaic. (Abstract) Phytopath. 17: 57. Jan. 1927.

5. Purdy, Helen A. Attempt to cultivate an organism from tomato mosaic. Bot. Gaz. 81: 210-217. 1926.

STREAK (CAUSE UNDETERMINED)

It has recently been reported by Dickson and Vanterpool (2, 4) that streak of tomatoes is the result of a mixed infection with the virus of tomato and potato mosaic. However, Berkeley (1) has recently submitted evidence to show that it is not necessary to have a combination of viruses in order to produce streak in tomatoes, but that it can be produced by inoculation with juice from either mosaic or streak potatoes, or from apparently healthy potatoes.

Tomato - Streak; Stem Rot; Bacterial Wilt

Although tomato streak has most commonly been reported as occurring in greenhouses, reports out-of-doors are becoming more frequent and this year two states, Ohio and Indiana, reported its occurrence in the field - in Ohio, H. C. Young reporting it as being quite abundant and in Indiana, M. W. Gardner stating that it was not uncommon late in the season.

Recent literature

1. Berkeley, G. H. Studies in tomato streak. Scient. Agr. 7: 210-223. Feb. 1927.

2. Dickson, B. T. Tobacco and tomato mosaic. (2) Streak of tomato in Quebec a 'double-virus' disease. Science 62: 398. 1925.

3. Gardner, M. W., and J. B. Kendrick. Potatoes a virus disease menace to tomatoes. Hoosier Horticulture 9 (1): 5-8. Jan. 1927.

4. Vanterpool, T. C. Streak or winter blight of tomato in Quebec. Phytopath. 16: 311-331. May 1926.

STEM ROT CAUSED BY CORTICIUM VAGUM BERK & CURT.

Damping-off of seedlings or collar rot of stems was reported from Connecticut, New York, Virginia, Florida, Indiana, Missouri, Texas, Kansas, and Washington. In Florida it caused considerable damage in the seed beds during January and February and also on larger plants in the field. In one instance 85 per cent loss in a two-acre field was noted. In Kansas a case of 20 per cent killing of young plants was reported March 24.

Recent literature

1. Small, T. Rhizoctonia foot rot of the tomato. Ann. Rep. Exp. & Res. Stat. Nursery & Market Gard. Industr. Devel. Soc. 11: 76-85. 1926.

BACTERIAL WILT CAUSED BY BACTERIUM SOLANACEARUM EFS.

This disease, normally southern in its range, was reported from Maryland, North Carolina, South Carolina, Florida, Alabama, Louisiana, and Texas. What seems to have been the same trouble was also reported by L. K. Jones of the New York Experiment Station as causing 10 per cent loss of the crop in a single canning section in western New York, the organism apparently having been introduced with the seed. In Maryland, 25 per cent of the plants were found badly affected

in one field in Prince George's County. In North Carolina, where 2.5 per cent loss for the state was estimated, G. W. Fant reported severe infection on the Horticultural Farm at the State College. In Alabama, L. E. Miles estimated the loss as 1 per cent and stated that the disease was common in the coastal districts, causing serious damage in some fields. The disease was also reported from Porto Rico (abundant and severe) by Mel. T. Cook and from the Philippine Islands (one of the most serious diseases of plants grown in vegetable gardens) by Mendicla and Ocfemia (1).

Recent literature

1. Mendiola, N. B., and G. O. Ocfemia. The work of breeding disease resistant crop plants at the College of Agriculture at Los Baños. Philipp. Agriculturist 15: 117-128. Aug. 1926.

BACTERIAL SPOT CAUSED BY BACTERIUM VESICATORIUM DOIDGE

During 1926 this disease was reported as occurring in New York, Florida, Indiana, Missouri, and Nebraska. A report of its occurrence in South Carolina, unsubstantiated by specimens, was made to the Survey by W. D. Moore. In New York it was observed on foliage and fruit in one field in Erie County, August 10. In Indiana, according to Gardner, infection was serious on the first set of fruits and was the worst that has occurred since 1919. He states that it was controlled by copper-lime dusts. In Missouri it was found commonly on local tomatoes in the markets, according to W. A. Archer.

A bacterial spotting of the fruit which may or may not have been caused by this organism was reported by D.G.A.Kelbert of Florida on May 26 as follows:

> "This disease has been a big factor this season, considerable damage having been noticed from this cause. The disease made its appearance following the very heavy wind early in April. The spots have every evidence of being caused by sand bruise, later bursting somewhat like a canker. They grow as large as 6 mm., often being so close together as to combine, making a spot one-half inch in diameter. I have found this disease in the field all through the season following the above mentioned rain, new young spots being found on the fruit continually."

Negative reports of the occurrence of bacterial spot were received from twenty-two states.

LATE BLIGHT CAUSED BY PHYTOPHTHORA INFESTANS (MONT.) D BY.

Late blight caused some damage to early tomatoes in Florida and in California. During some years it is prevalent in northern states such as Virginia and West Virginia, but during 1926 the collaborator for West Virginia reported

that an interesting feature of the season was the failure to find a single case of this disease in the state.

In Florida, G. B. Ramsey reported finding the disease in certain localized areas but it did not appear to be doing much damage. In California it was of considerable importance as indicated by the following reports:

"In the tomato fields several of the usual tomato diseases are beginning to be evident. Among the commonest of these is the so-called late blight (Phytophthora infestans) which attacks both tomatoes and potatoes." (C. A. Gorton, Calif. Cult. May 22, 1926.

"The only draw-back of the tomato season (Orange County, California) was the late blight and, though many shippers handled the situation successfully, a few lost money. One large firm had very good results by setting the stock back for a short time to determine whether blight would develop. They also turned down some patches known to be badly infested with the disease. Another shipper signed up some of these infested patches, and stood some heavy losses from the blight as a result." (H. G. Whitney, Dec. 10, 1926.)

"At the present time (Nov. 8, 1926) a great many of the California tomatoes arriving on the market show a semi-watery to watery decay about the stem-end and upper half of the fruit ..... I find that my notes indicate that most of this disease was found in cars from Los Angeles, Sacramento, and Stockton. In some cars the decay ranged from 3 per cent to as high as 40 per cent, the average for most cars being between 3 per cent and 15 per cent. I have been in the Market Pathology work and advisor to the Food Products Inspection Service of the Bureau of Agricultural Economics since 1919, but have never seen an appreciable amount of this type of rot until this season." (G. B. Ramsey)

"Late blight occurred on tomatoes in Orange County late in October, 1926. It did not injure leaves very much, but caused a considerable damage of fruit in some individual fields extending to about 30 per cent. I may add to this that last month(Jan. 1927) I noticed an alarming outbreak of this disease on tomato seedlings in a few greenhouses in Los Angeles County. I presume, however, that with the advent of different weather the disease may be checked." (Shapovalov)

BUCKEYE ROT CAUSED BY PHYTOPHTHORA TERRESTRIS SHERB.

Buckeye rot was reported from Maryland, Florida and Tennessee and what was thought to be either this species or Phytophthore parasitica was reported from Indiana. Reports of non-occurrence were received from 22 other states.

In Maryland, Norton and Jehle reported 30 per cent loss in one field in Prince George's County. In Florida, according to Kelbert, the disease took about 35 per cent of the earliest fruit and caused about 15 per cent damage to the total crop. It appeared after the first rains during the latter part of March. In Indiana, according to Kendrick, heavy rains in August and September brought on a rot which totally destroyed all of the fruit in some fields. It was not a ripe rot but typically a rot of green immature fruits.

LEAF MOLD CAUSED BY CLADOSPORIUM FULVUM CKE.

This common disease of greenhouse tomatoes doubtless occurs widely, but it was only reported to the Survey in 1926 from seven states and Porto Rico. In all of these, with the exception of Florida and Porto Rico, it was mentioned as occurring on tomatoes under glass, in some instances affecting them seriously. In Florida it made its appearance about the middle of May, according to D. G. A. Kelbert, but since the crop was well advanced the attack was too late to do much damage. In Porto Rico, Mel. T. Cook says that the disease is common and sometimes severe on tomatoes grown in the open.

Recent literature

1. Guba, E. F. The control of tomato leaf mold or "mildew" in the greenhouse. Amer. Produce Grow. 1 (4): 6. Dec. 1926.

2. Williams, P. H. Tomato leaf mold. Ann. Rep. Exp. & Res. Stat. Nursery & Market Gard. Industr. Devel. Soc. 11: 67-72. 1926.

BLOSSOM-END ROT, NON-PARASITIC

In 1926 blossom-end rot was reported as being more prevalent than usual in the states of Delaware, Virginia, Kentucky, Missouri, Iowa, and Florida. In the other states reporting it the disease was of average or below average prevalence. A number of collaborators mentioned its being especially common on the early crop while the later crop which matured following rains in August was not badly affected. A loss of 10 per cent was reported from Missouri. The next highest estimate of damage came from Kentucky where 5 per cent reduction in yield was estimated. Other estimated losses were Georgia, 4 per cent; Alabama and Texas, 3 per cent; North Carolina, 2 per cent; New York, 1 to 2 per cent; Maryland, Virginia, Iowa, and Kansas, 1 per cent. In the Crystal Springs trucking section of Mississippi it was thought that nearly one-third of the early crop was affected with blossom-end rot. It was also quite a factor in reducing the yield in Florida from the middle of April on to the end of the shipping season.

OTHER DISEASES
Tomato - Other Diseases

Aplanobacter michiganense EFS., bacterial canker, was quite serious in many greenhouses in Ohio, according to R. C. Thomas. The disease did not appear to be an economic factor in the field.

Blossom drop (non-par.) A specimen of this trouble was received from New York early in July. J. J. Taubenhaus reports it a very important trouble in Texas, causing about 2 per cent loss.

Colletotrichum phomoides (Sacc.) Chester, anthracnose, was reported from New Jersey, Maryland, Indiana, and Missouri. Only moderate damage was reported in all cases. Gardner of Indiana states that since the rot does not greatly discolor the fruit it is not so objectionable to canners as certain other decays.

Cuscuta sp., dodder. A case of severe infestation of tomato plants in seed beds planted on land where alfalfa had been grown last year was reported by R. A. Jehle of Maryland.

Caconema radicicola (Greef) Cobb, root-knot, several of the southern states report damage from root-knot. In South Carolina W. D. Moore says that it is becoming serious everywhere. In southern Georgia one 5-acre field was reported by O. C. Boyd where the infection was 100 per cent and the loss estimated at 50 per cent. In Missouri, according to Archer, severe damage was noted in the southeastern section and in some greenhouses in other parts of the state. In California, Milbrath estimated the loss at 3 per cent.

Hollow stem (undet.) Stems hollow for a distance of 4 to 5 inches, or, in most cases, about one-half their length, were reported by the Department of Plant Pathology of New Jersey. Plants wilted from the top down and finally died. There were streaks of discolored tissue in longitudinal sections.

Lightning injury (non-par.) was observed on July 28 in New Jersey.

Macrosporium sp., stem canker, was reported by Adams of Delaware as being much more prevalent than last year, seriously cutting the stands in commercial canning crops.

Phoma destructiva Plow., ripe-rot, traces observed in Florida and Texas.

Cospora lactis parasitica Pritchard & Porte, fruit-rot, New Jersey.

Pythium sp., damping-off, observed in greenhouse in New York and in seed beds in South Carolina.

Puffing (undet.) Very severe and prevalent on the variety Detroit in Texas according to Taubenhaus. Also caused some loss in California according to Milbrath.

Sclerotium rolfsii Sacc., stem rot, was reported from Tennessee; South Carolina particularly severe in fields where no rotation was practiced; Florida- found entirely on old ripe fruit in the field; Alabama - important locally in southern section of state, loss as high as 20 per cent in some fields; Mississippi - many fields show only a trace but one field was observed with 35 per cent infection; Arkansas - considerable injury reported in southeastern Arkansas on early crops, several specimens sent in; Kansas - in experimental plots at Manhattan.

Sclerotinia sclerotiorum (Lib.) Mass., stem-rot, was reported from Florida, Ohio, and Illinois. In Ohio, it was noted especially in several greenhouses in June and July. In one house, where a crop of lettuce badly affected with rot had immediately preceded tomatoes, 15 per cent of the plants were infected.

Verticillium alboatrum Reinke & Berth., wilt, was reported by B. A. Rudolph from the San Francisco Bay region of California where it showed up in June in about the same prevalence as usual. D. G. Milbrath estimates that this disease probably caused a loss of one-half per cent in California.

Tomato - Miscellaneous Literature
Sweet Potato - Stem Rot

Recent literature

1. Becker, A. Die Braunfleckenkrankheit der tomaten. Blumen u. Pflanzenb. 41: 122-123. Apr. 15, 1926.

2. Bewley, W. F., and H. L. White. Some nutritional disorders of the tomato. Ann. Appl. Biol. 13: 323-338. Aug. 1926.

3. Brown, N. A stem-end and center rot of tomato caused by various unrelated organisms. Jour. Agr. Res. 33: 1009-1024. Dec. 1, 1926.

4. Fenton, F. A. A case of arsenical injury to tomato plants. Proc. Iowa Acad. Sci. 31 (1924): 135-137. 1926.

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DISEASES OF SWEET POTATOES

STEM ROT CAUSED BY FUSARIUM BATATATIS WOLL. AND F. HYPEROXYSPORUM WOLL.

This widespread and important disease of sweet potatoes seemed to be less prevalent in the Maryland, New Jersey, and Virginia section than last year, but in a majority of the Southern States and in Kansas and Indiana it was said to be more prevalent than in 1925. The percentage losses were reported as follows: New Jersey, 15; Missouri, 10; Iowa, 8; Kansas, 6; North Carolina, 5; Alabama and Indiana, 4; Delaware, Maryland, Virginia, Georgia, and Arkansas, 3; Tennessee and California, 2; Washington, 1. In Arkansas, according to Rosen, it was very common, 50 per cent infection being counted in one field. What is probably the first authentic report of this disease from Colorado was made by L. L. Harter. Doctor Harter also estimated 1 per cent infection in Washington, where several hundred acres of sweet potatoes are now being grown.

The varieties White Yam, Red Brazil, and Yellow Yam were reported as very resistant in New Jersey. Varieties reported as susceptible were Yellow Jersey; Big Stem Jersey, Porto Rico, and Triumph in Georgia; and Nancy Hall in Arkansas. R. F. Poole (1, 2) continues to report beneficial results in the control of this disease by planting two or three plants in a hill in order to offset cutting down the stands by the disease.

Recent Literature

1. Poole, R. F. Cultural methods for reducing sweet potato losses caused by stem rot. New Jersey Agr. Exp. Sta. Bul. 433: 1-16. 1926.

2. _____ Fusarium wilt of sweet potatoes on infested soil. Phytopath. 17: 42-43. Jan. 1927.

BLACK ROT CAUSED BY CERATOSTOMELLA FIMBRIATA (ELL. & HALS.) ELLIOTT

As usual blackrot was widespread in sweet potato states. Reports of collaborators indicate that it is gradually decreasing owing to the use of certified seed, seed treatment, seed bed sanitation, and other control measures. The collaborators' estimates of losses for the last eight years have shown a gradual reduction in amount of loss.

In 1926, however, the states of North Carolina, Arkansas, Indiana and Arizona reported the disease as more prevalent than usual. Losses from black rot occur both in the field and in storage. Estimates(percentage) of losses in the field as given by collaborators in 1926 are : Kentucky, 15; Mississippi, 5; Arkansas, 4; Alabama and Texas, 3; Tennessee, North Carolina, Iowa, California, 2, Arizona, 1.5; Maryland, Virginia, South Carolina, Louisiana, 1; Delaware, Georgia, Kansas, 0.5. In North Carolina, R. F. Poole reports the rot as most severe in low areas of fields.

H. D. Barker (1) reports that black rot is of considerable economic importance in Haiti because of its prevalence and the importance of the sweet potato as a food crop. He states that in some cases the damage amounts to 90 per cent of the crop and that very little attempt is made to control the disease.

Recent Literature

1. Barker, H. D. Plant diseases in Haiti. Intern. Rev. Sci. & Pract. Agr. 4: 184-187. Jan.-Mar. 1926.

2. Harter, L. L., J. L. Weimer, and J. I. Lauritzen. The comparative susceptibility of sweet potato varieties to black rot. Jour. Agr. Res. 32: 1135-1142. 1926.

3. Harter, L. L. and W. A. Whitney. Influence of soil temperature and soil moisture on the infection of sweet potatoes by the black rot fungus. Jour. Agr. Res. 32: 1153-1160. 1926.

4. Lauritzen, J. I. Infection and temperature relations of black rot of sweet potatoes in storage. Jour. Agr. Res. 33: 663-676. 1926.

SOIL ROT CAUSED BY CYSTOSPORA BATATA (ELL. & HALS.) ELLIOTT

Estimates of losses from this disease in 1926 were: Kansas, 3 per cent; New Jersey, 2 per cent; Delaware and Maryland, 0.5 per cent; Virginia, North Carolina, and Louisiana, a trace.

New Jersey: Severe in only a few instances. In these cases the fields had previously been limed. (Martin)

North Carolina: Observed in Currituck County on the Yellow Jersey variety and in Craven County on the Porto Rico variety. (Poole)

Reports of non-occurrence were received from eight other sweet potato states.

SCURF CAUSED BY MONILOCHAETES INFUSCANS HALS.

Scurf was reported as occurring rather generally with the crop and for the most part in the same amount as usual, although in Tennessee, Arkansas, Iowa, and Arizona more than the average was noted. The losses from scurf are due to the unsightly appearance of the roots and to shrinkage which may occur in storage. Arizona reported the most trouble from this disease. According to R. B. Streets of that state it occurs in practically all plantings and is the most prevalent disease. The chief loss is reduction in grade of tubers. In Georgia, O. C. Boyd noted a 10-acre field in Coffee County in which digging was delayed until fall and infection was unusually severe. In North Carolina, R. F. Poole reported that the use of potatoes grown on vine cuttings in the plant bed for the development of sprouts has had much to do with the present excellent control of the disease. E. M. Page in Missouri reports that damage seems to be correlated with the amount of organic matter in the soil.

FOOT ROT CAUSED BY PLENODOMUS DESTRUENS HARTER

The only states reporting foot rot in 1926 were Maryland, Virginia, Georgia, Alabama, and Mississippi. In Georgia an infestation was found on a single farm in Coffee County where plants were grown from New Jersey potatoes. O. C. Boyd writes as follows concerning this case:

"The entire crop of potatoes was dug in August, loaded into barrels in the field, and shipped out of the state for eating purposes. All vines in that field were destroyed by cutting with a disc harrow and exposing to the sun. Fifty acres of vine cuttings were destroyed. The entire farm was quarantined, covering the prohibiting of growth of sweet potatoes for a period of five years. The potatoes were shipped into Georgia in violation of the state rules and regulations governing the importation of sweet potatoes into the state."

MOSAIC (UNDETERMINED)

Alabama, Mississippi, Missouri, and Arkansas reported sweet potato mosaic in 1926, but in none of them was over a trace of loss estimated. In Mississippi it was said to be present in a large number of sweet potato fields in nearly every section of the state. In Arkansas, members of the Department of Plant Pathology noted a considerable amount on Nancy Hall potatoes growing near Fayetteville.

During the year Wedgworth (3) conducted a preliminary experiment comparing the yields of mosaic and healthy plants and found that the mosaic diseased plants yielded only 38.9 per cent as much as healthy ones.

Recent Literature

1. Rosen, H. R. Sweet potato mosaic and its incubation period of two growing seasons. (Abstract) Phytopath. 16: 74. 1926.

2. _____ The mosaic disease of sweet potatoes with special reference to its transmissibility. Arkansas Agr. Exp. Sta. Bul. 213: 1-16. Aug. 1926.

3. Wedgworth, H. H. Effect of mosaic on sweet potato yields. Quart. Bul. State Plant Board of Mississippi 6 (3): 11-12. Oct. 1926.

4. Weimer, J. L. Further evidence of the non-transmissibility of the so-called sweet potato mosaic. (Abstract) Phytopath. 16: 74. 1926.

STORAGE ROTS

The decay of sweet potatoes in storage houses and pits is sometimes very great. It would appear, however, that owing to better storage conditions and improved methods this source of waste is being reduced. Chief among the organisms causing loss in storage is Rhizopus nigricans Ehr., but other organisms

such as Diplodia, Fusarium, and the black rot fungus(Ceratostomella fimbriata) are also responsible for much damage. Sweet potato storage losses reported in December 1926 for the year previous are: Arkansas and Kentucky, 30; Texas, 20; North Carolina and Louisiana, 15; Georgia, 12; Arizona, 11; Maryland, Alabama, and Mississippi 10; South Carolina, 8; Tennessee, 7; Virginia and Washington, 5; Kansas and California, 3; Delaware, 2.

OTHER DISEASES

Albugo ipomoeae-panduranae (Schw.) Sw., white-rust, was reported from New Jersey, Delaware, North Carolina, and Porto Rico.

Caconema radicicola (Greef) Cobb, root-knot, Specimens of sweet potatoes affected with root-knot were received from Pope County, Arkansas, March 25. The Department of Plant Pathology at Fayetteville, Arkansas, reports the pest as being common and important. In California, the assistant farm advisor in Los Angeles County reported the Porto Rico variety as very resistant to root-knot.

Diplodia tubericola (Ell. & Ev.) Taub., Java black rot, R. F. Poole of North Carolina reported that this fungus was prominently associated with others in destroying more than 3,000 bushels of Porto Rico potatoes in a single storage house in North Carolina in 1925. Apparently the rot originated in the field. The disease was also reported from Texas by Taubenhaus.

Phymatotrichum omnivorum (Shear) Dug., root rot, was reported by J. J. Taubenhaus as affecting sweet potatoes in the black lands of Texas, possibly causing 3 per cent loss. It was also observed on sweet potatoes in Arizona where 2 per cent loss was estimated.

Phyllosticta batatas (Thuem.) Cke., leaf spot, caused slight defoliation of the Big Stem Jersey and Norton Yam varieties in North Carolina, according to R. F. Poole.

Pythium sp., rootlet rot. L. L. Harter observed this disease in the state of Washington during the summer of 1926. He estimated 5 per cent infection in the fields he visited.

Rhizoctonia sp., damping-off, was reported on sweet potatoes from Texas.

Sclerotium bataticola Taub., charcoal rot, was reported from North Carolina and Texas. In North Carolina, Poole reported that the Jersey varieties grown for the early market in Currituck County were slightly diseased in August. After the marketable potatoes were removed the small potatoes and stems left on top of the ground in some fields were attacked by the fungus. It was also found to be associated with other fungi causing loss in storage houses.

Sclerotium rolfsii Sacc., stem rot. Collaborators in Georgia and Alabama report this fungus as causing frequent damage in seed beds.

Septoria bataticola Taub., leaf spot, observed in few fields in New Jersey.

Recent Literature

1. Lauritzen, J. I. A strain of yellow Jersey sweet potato resistant to surface rot (Fusarium oxysporum W. & C.). Jour. Agr. Res. 33: 1091-1094. 1926.

2. _____ and L. L. Harter. The relation of humidity to infection of the sweet potato by Rhizopus. Jour. Agr. Res. 33: 527-539. 1926.

3. Poole, R. F. Fertilizer injuries to sweet potatoes. Better Crops 6 (4): 5-6, 47-51. June 1926.

4. Small, W. Rhizoctonia bataticola (Taub.) Butler. Trop. Agr. Ceylon 67: 237-239. Oct. 1926.

5. _____ On the identity of Rhizoctonia lamellifera and Sclerotium bataticola. Trans. Brit. Myc. Soc.10: 287-302. 1926.

DISEASES OF BEAN

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LINDEMUTHIANUM (SACC. & MAGN.) BRIOSI & CAV.

On account of dry weather early in the season anthracnose was slow in appearing but with the advent of rains in August and September it became the cause of some damage to the late crop. Collaborators in the states of New York, Maryland, South Carolina, Indiana, Kentucky and Minnesota reported more than the average year, while others reported the same or less than the average year. The disease was not reported to any extent west of the Great Plains. Some of the collaborators' reports are as follows:

New York: Not much early infection due to dry weather but developed later in the season. (Barrus)

Maryland: Seed from irrigated sections of Idaho had less than seed from Michigan, New York, and Maryland. (Zehle & Temple)

Kentucky: Canners reported the crop cut in half in Carlisle County. This was the crop canned in late July. (J. S. Gardner)

Georgia: Very little observed on early crop. More in late fields. (Boyd)

Ohio: Very prevalent on snapbeans especially in latter part of season. Many small gardeners experienced severe epidemics. (H. C. Young)

Indiana: Not serious in canning crop since it was harvested before wet weather. Bad in gardens late in season. (Gardner & Kendrick)

Michigan: Where conditions were favorable, as in northwestern part of the southern peninsula, anthracnose caused some damage. In most sections of the state it was too dry for development. (Nelson)

Wisconsin: More on canning beans than dry beans. Rains did not come early enough to cause much damage. (Vaughan)

The reductions in yield on account of this disease as reported by collaborators were 3.5 per cent, New York; 3 per cent, South Carolina; 2 per cent, Maryland; 1 per cent, Virginia, Mississippi, Louisiana; 0.5 per cent, Delaware, Georgia, Michigan, and Tennessee; trace, West Virginia, Wisconsin, Minnesota, Iowa, Missouri, Kansas, Arkansas, and Montana.

Recent Literature

1. Boning, K. Ueber die Empfänglichkeit von Phaseolus vulgaris für Colletotrichum lindemuthianum im Lichte der Rassenbildung des Krankheitserregers. Forsch. auf dem Gebiet der Pflanzenkrankh. u. der Immunität im Pflanzenreich 2: 4-18. 1926.

2. Esmarch, F. Die Brennfleckenkrankheit der Bohnen. Kranke Pflanze 3: 181-185. Oct. 1926.

3. Muller, H. R. A. Physiologic forms of Colletotrichum lindemuthianum (Sacc. et Mag.) Bri. et Cav. in the Netherlands. Phytopath. 16: 369. 1926.

BACTERIAL BLIGHTS CAUSED BY BACTERIUM PHASEOLI EFS., B. FLACCUMFACIENS HEDGES, AND PHYTOMONAS MEDICAGINIS PHASEOLICOLA BURK.

It was not until recently that these diseases were distinguished from one another. Hedges (2) has recently described the bacterial wilt caused by B. flaccumfaciens as being rather widely distributed in bean growing sections and causing primarily a wilt rather than a blight. One phase of the disease is a breaking over of the diseased plants at one of the nodes. Burkholder (1) has described a disease caused by Phytomonas medicaginis phaseolicola from New York State with symptoms not unlike those caused by the other two organisms. It also produces a wilt as a result of invasion of the vascular system. One of the most characteristic symptoms is a dwarfing and mottling of the leaves not unlike mosaic. Stems, pods, and seed are affected. In the past these three diseases have all been considered as bacterial blight (B. phaseoli) but from now on they should be distinguished as far as possible.

In 1926 bacterial blights were reported from the majority of the Eastern States as far west as the Great Plains. New York, New Jersey, Indiana, and Minnesota were the only states reporting more than usual. In New York these were the most serious diseases of beans. On September 27, L. K. Jones of that state wrote:

"Very abundant on Green Refugee variety of canning beans in the state. Extreme damage in local sections causing joint rot. Ten to 15 per cent damage to crop in state. Less important on wax beans. In general less damage than last year."

Other reports on prevalence were:

New Jersey: Because of blight and low prices many fields were plowed under before harvesting. (Dept. Pl. Path.)

Ohio: Very serious on snapbeans this year in all sections of the state. (Thomas)

Wisconsin: Leading symptom is breaking of stems and lower nodes. Also water-soaked spots on leaves. (Vaughan)

Colorado: Five per cent reduction in yield in Greeley district. Severity varies with variety and source of seed. Earlier maturing varieties showing more general infection. No control measures practiced. (H. G. MacMillan)

Arizona: In northern Arizona it was present in all fields where the vines were old enough to flower. In many instances early plantings were severely diseased and the vines died weeks ahead of maturity. (Brisley)

The estimates of losses as reported by collaborators were: 4 per cent, Indiana and Louisiana; 3 per cent, Montana and Michigan; 1.5 per cent, Texas and Maryland; 1 per cent, Connecticut, Virginia, Wisconsin, Minnesota, and Mississippi.

Beans of the medium, marrow, and Robust Pea types were reported as resistant in New York, while the Red and White Kidneys were said to be very susceptible in South Carolina, according to W. D. Moore.

Recent Literature

1. Burkholder, W. H. A new bacterial disease of the bean, Phytopath. 16: 915-927. Dec. 1926.

2. Hedges, Florence. Bacterial wilt of beans (Bacterium flaccumfaciens Hedges), including comparisons with Bacterium phaseoli. Phytopath. 16: 1-22. 1926.

3. Link, Geo. K. K., and C. G. Sharp. Serological differentiation of Bacterium campestre from Bact. phaseoli, Bact. sojense, and Bact. flaccumfaciens. (Abstract) Phytopath. 17: 53-54. 1927.

4. Sharp, C. G. Correlation of virulence and acid agglutination of a smooth and a rough strain of Bacterium phaseoli sojense. (Abstract) Phytopath. 17: 49. 1927.

5. _____ Serological and physiological studies of Bacterium phaseoli, Bact. phaseoli sojense, and Bact. flaccumfaciens. (Abstract) Phytopath. 17: 54. 1927.

RUST CAUSED BY UROMYCES APPENDICULATUS (PERS.) LINK.

Rust was reported from 14 widely scattered states. In Florida and Colorado it was said to be more prevalent than usual. On the other hand, in southern Georgia, Illinois, Michigan, and North Dakota it was said to be less in evidence. Losses of 1 per cent were estimated for Virginia and Texas while in most of the other states only traces of damage occurred. Collaborators in four states report Kentucky Wonder as susceptible. In Colorado the Mexican Pinto is said to be very liable to infection.

Recent literature

1. Waters, C. W. The reactions of bean rust grown on leaves in solutions. Papers Mich. Acad. Sci. 5: 163-177. 1926.

ROOT ROTS DUE TO VARIOUS CAUSES

Dry root rot caused by Fusarium martii phaseoli Burk. was reported from New York, especially in the western portions, West Virginia, Florida, and Indiana. During the past year also Weimer and Harter (1) have given a description of bean root rot in California caused by this fungus and by a new species, F. aduncisporum. In New York, M. F. Barrus reports Perry Marrow as resistant, Blue Pod Medium and marrows in general as susceptible, and Navy Pea as very susceptible.

Root rot caused by Fusarium spp. A severe root rot was reported from Mississippi during the year, as high as 90 per cent infection being observed in one field and an average estimated loss for the state of 2 per cent being made. In northern Arizona, H. G. Brisley reports that root rot is always bad in some sections and can generally be depended on to cause a 20 per cent loss. From Idaho the report was received that root rot was general and probably caused a loss of 2 per cent for the state. Oregon and California are other states reporting Fusarium root rot.

Undetermined root rots were reported from New York, Florida, Georgia, and California.

New York: Early cold season (June) delayed germination and growth, reducing vitality of roots. Also extreme injury resulted from attacks of the corn seed maggot on roots and stems in the cold early season. Average stand of plants resulting from these factors did not exceed 50 per cent in the state (canning or snap-beans). (L. K. Jones)

Florida: Several fields have been observed which showed considerable reduction in stand and retarded growth from root diseases. The etiology of the injury has not been determined. In some cases Rhizoctonia appeared to be the cause while in other fields different symptoms were manifest. (Tisdale)

Georgia: This disease, with a reddish, swollen, pithy tap-root was unusually prevalent this year. Sclerotium batatícola repeatedly isolated. (Boyd)

Recent Literature

1. Weimer, J. L., and L. L. Harter. Root rot of the bean in California caused by Fusarium martii phaseoli Burk. and F. adjuncisporum n. sp. Jour. Agr. Res. 32: 311-319. 1926.

STEM ROT CAUSED BY CORTICIUM VAGUM BERK. & CURT.

In 1926 stem rot was reported from the majority of the Atlantic and Gulf states from Massachusetts to Texas, and also from Arizona and California. In Massachusetts it was said to be common and severe throughout the state. In New Jersey only traces of loss were noted. In Maryland one field was found with 5 per cent of the plants severely injured. In Virginia it was said to be the cause of considerable damage in the Tidewater Section on snapbeans. In Charleston County, South Carolina, Fenner reported three fields with 20 per cent infection. In Arizona and in California 1 and 3 per cent reduction in yield was estimated, respectively.

ASHY STEM BLIGHT CAUSED BY MACROPHOMA PHASEOLI MAUB.

This disease, but recently reported in this country and heretofore known only in South Carolina, was reported in 1926 from other locations in that state and also from Georgia and Mississippi. In Georgia it was observed May 10 in Thomas County by O. C. Boyd and W. A. Whitney in a one-acre field where the loss was about 5 per cent. In Mississippi three scattered cases were found. Concerning the Mississippi situation H. H. Wedgworth wrote on September 29 as follows:

"Beans infected with a stem rot and having fruiting bodies very similar to Macrophoma phaseoli have been collected from two fields in Oktibbeha County and from one field in George County. The disease was quite destructive, especially in one field this year. This particular field in Oktibbeha County suffered a loss of about 60 or 65 per cent of the plants from the spring planting. Unfortunately, the grower planted this field

to fall beans and the disease has been prevalent in this planting also to the extent of about 50 per cent."

This disease has been called ashy stem blight by Ludwig on account of the grayish coloration of affected stems and lower branches.

Recent Literature

1. Anon. A new fungus pest of beans. Science n. s. 64: 10, 12. Sept. 17, 1926.

2. Wedgworth, H. H. A new bean disease in Mississippi. Quart. Bul. State Plant Board of Mississippi 6 (3): 6-10. Oct. 1926.

MOSAIC (UNDET.)

Mosaic occurred widely in the bean crop. In the western United States mosaic and curly top have been and probably still are, confused. Recently Carsner (1), and also McKay and Dykstra, have shown that the bean is a host of the sugar beet curly top virus.

Mosaic ranks with the bacterial blights and anthracnose in importance. Estimates of reduction in yield were: 6 per cent, Iowa, and Montana: 5 per cent, Idaho and Minnesota; 4 per cent, Indiana; 3 per cent, Mississippi; 2 per cent, Michigan and Washington; 1 per cent, Arizona; 0.2 per cent, California; and 0.1 per cent, Tennessee.

Resistant varieties reported during 1926 were: Robust Pea and Red and White Kidneys in New York and Robust in Idaho. The susceptible varieties were Navy Pea, Scotia, Refugee Wax and others in New York; Giant Stringless Green Pod and Kentucky Wonder in Mississippi; Rogers Improved Kidney Wax and Kenneys White Seeded Refugee Wax in Indiana; Refugee Green in Wisconsin, and Lady Washington and Little Navy in Idaho.

CURLY TOP (UNDET.)

Reports of this disease, caused by the same virus as that of curly top of beet, were received from Idaho and Oregon. In Idaho, Eubanks Carsner found that the damage was extensive and was led to believe that this was the cause of considerable loss of Idaho beans in 1924. In Oregon, M. B. McKay estimated a loss of one-half of the bean crop. The hot, dry season was favorable for leafhoppers with a result that the disease was more widespread and destructive than ever before.

Recent Literature

1. Carsner, E. Susceptibility of the bean to the virus of sugar beet curly top. Jour. Agr. Res. 33: 345-348. Aug. 15, 1926.

OTHER DISEASES

Alternaria fasciculata (Cke. & Ell.) Jones & Grout, leaf spot. Collected in Missouri.

Chlorosis caused by excess lime. Texas.

Caconema radicicola (Greef) Cobb, root knot. Virginia - very severe on Navy bean at Surrey. South Carolina - one report. Southern Georgia - 5 per cent reduction in yield. Mississippi - one report. Texas - prevalent in light sandy loams. Missouri - found in one field of sandy soil in southeastern part of state. California - 2 per cent loss.

Erysiphe polygoni DC., powdery mildew. Virginia - severe on the Bountiful variety in eastern Virginia according to McWhorter. South Carolina - traces loss. Florida - more than usual; general. Texas - Prevalent. California - 0.2 to 0.3 per cent loss.

Isariopsis griseola Sacc., angular leaf spot. Specimen received from Ridgely, Maryland, September 9. Also reported as occurring locally in Florida.

Phymatotrichum omnivorum (Shear) Dug., root rot - Fairly prevalent on beans in Rio Grande Valley of Texas, according to Tautenhaus.

Pythium sp., rootlet rot. Collected by Drechsler and Whitney at Bladensburg, Maryland.

Sclerotinia sclerotiorum (Lib.) Mass., stem rot. A very important disease of beans in Florida according to Weber.

Sclerotium rolfsii Sacc., stem rot. South Carolina - trace of loss. Mississippi - general throughout the state; as high as 50 per cent loss in some gardens and fields.

DISEASES OF LIMA BEAN

DOWNY MILDEW CAUSED BY PHYTOPHTHORA PHASEOLI THAX.

This disease was reported from Connecticut, New York, Pennsylvania, New Jersey, and Delaware. On Long Island, N. Y., E. E. Clayton reported more than usual with losses as high as 15 and 20 per cent. In the vicinity of Philadelphia, Pennsylvania, W. S. Beach estimated a reduction in yield of 3 per cent and as high as 25 per cent infection in some fields.

In Pennsylvania, Beach continued control experiments with copper-lime dust, dusting sulfur, and dry-mix lime-sulfur. Successful control was obtained by copper-lime dusting even though the first application was delayed until September when the first signs of infection were evident. Results with sulfur were not satisfactory.

OTHER DISEASES

Bacterium vignae Gardner & Kendrick. (B. viridifaciens Tisdale & Williamson) was reported from Long Island, New York, where, according to E. E. Clayton much defoliation reduced the set of pods; New Jersey, where it was thought to be present wherever lima beans are grown; and Pennsylvania, where W. S. Beach reported traces of loss with as nigh as 10 per cent infection in some fields.

Cercospora cruenta Sacc., leafspot. One collection in Missouri, by W. A. Archer, October 16.

Colletotrichum lindemuthianum (Sacc. & Magn.) Br. & Cav. Collected at Bladensburg, Maryland, by Drechsler and Whitney.

Diaporthe phaseolorum (Cke. & Ell.) Sacc., pod blight. Much more than usual was reported from Delaware by J. F. Adams. Collections were also made in Maryland and Mississippi.

Fusarium aduncisporum Weimer & Harter, root rot. Widespread and the cause of considerable damage in California according to Weimer and Harter (1).

Fusarium martii phaseoli Burk., dry root rot. This fungus has been found by Weimer and Harter (1) to be the cause of serious root rot to lima beans as well as common beans in California. On June 16 a specimen affected with dry root rot was sent in to the Bureau of Plant Industry from Grafton, West Virginia, and the fungus determined as Fusarium martii phaseoli.

Pythium sp., rootlet rot. Collected at Bladensburg, Maryland, by Whitney and Drechsler, September 1.

Recent Literature

1. Weimer, J. L., and L. L. Harter. Root rot of the bean in California caused by Fusarium martii phaseoli Burk. and F. aduncisporum n. sp. Jour. Agr. Res. 32: 311-319. Feb. 15, 1926.

DISEASES OF ONION

SMUT CAUSED BY UROCYSTIS CEPULAE FROST

Smut was reported in 1926 from onion sections in Connecticut, New York, Maryland, Ohio, Michigan, Wisconsin, Minnesota, Iowa, North Dakota, Kansas, and Idaho. It will be noted that most of these states are in the northern half of the country. Walker and Wellman (4) in their work on the temperature relations of onion smut have pointed out that comparatively low temperatures are favorable for the disease and that it occurs in the more northern and cooler sections of the United States and Europe. In New York, M. F. Barrus makes the observation that the infested area in the Orleans-Genesee County section is increasing in extent from year to year. In Ohio also smut is said to be on the increase in places where the formaldehyde soil treatment is not used. In Michigan specimens were received from commercial onion fields in Van Buren County. This seems to be the first definite report of the disease in that state, which seems rather singular, considering the fact that the disease has long been established in this country, particularly in northern sections.

From Oregon, H. P. Barss reported that smut continued to occur in the western part of the state but was well controlled by the formaldehyde drip treatment.

Recent Literature

1. Alcock, N. L., A. E. S. McIntosh, and G. B. Wallace. The control of onion smut. Scott. Jour. Agr. 9: 65-70. Jan. 1926.

2. Blizzard, A. W. The nuclear phenomena and life history of Urocystis cepulae. Bul. Torrey Bot. Club 53: 77-117. 1926.

3. Szembel, S. J. (Some observations on the biology of the smut fungus Urocystis cepulae Frost.) La Defense des Plantes, Leningrad 2: 521-530. 1925.

4. Walker, J. C., and F. L. Wellman. Relation of temperature to spore germination and growth of Urocystis cepulae. Jour. Agr. Res. 32: 133-146. 1926.

DOWNY MILDEW CAUSED BY PERONOSPORA SCHLEIDENI UNG.

Out of 26 state reports, 19 recorded downy mildew as not having been found during the year, while 7, namely, New York, Maryland, Georgia, Arkansas, Wisconsin, Oregon, and California, reported its occurrence. In New York, 5 per cent reduction in yield was estimated by J. G. Gaines. The disease was most prevalent during the first two weeks in August and was favored by wet weather. In Maryland a trace of loss was said to have occurred late in the season. In Georgia it was common on seedlings early in the year (February). Its occurrence in Arkansas was remarked by collaborators as this is the first time it has been reported for several years. In the central California coastal region heavy damage took place in seed fields, where as high as 50 per cent loss occurred in many cases. Seed stalks were spotted causing them to break over. D. G. Milbrath estimated a loss of 40 per cent to the seed crop.

Recent Literature

1. Katterfeld, M.O. Zur Biologie der Peronospora schleideni Ung. Bolezni Rast. 15: 71-87. 1926.

2. Murphy, Paul A., and Robert McKay. Some new facts concerning onion mildew. Jour. Dept. Lands & Agr. Ireland 26: 115-123. 1926.

3. _____ The downy mildew of onions (Peronospora schleideni) with particular reference to the hibernation of the parasite. Sci. Proc. Roy. Dublin Soc. n.s. 18: 237-261. July 1925.

NECK ROTS CAUSED BY BOTRYTIS SPP.

J. C. Walker has described three distinct neck rot diseases of onion bulbs, namely, grey mold neck rot (Botrytis allii Munn), mycelial neck rot (Botrytis byssoidea Walker), and small sclerotial neck rot (Botrytis squamosa Walker); The first named disease was reported in 1926 from Connecticut, New York, and Indiana. The second, mycelial neck rot, was reported from Wisconsin and Illinois where it was said to be severe in the Racine - Kenosha and the Chicago districts on white onions. The injury was estimated at from 10 to 80 per cent. Red and yellow varieties were comparatively free.

Recent literature:

1. Walker, J. C. Botrytis neck rots of onions. Jour. Agr. Res. 33: 893-928. Nov. 15, 1926.

BULB ROT CAUSED BY FUSARIUM SPP.

Link and Bailey (1) have reported several different Fusaria causing bulb rot, with practically identical symptoms. In 1926 these rots were reported from New York, Indiana, Arizona, and Washington and market inspectors found them in onions from many other states.

Recent Literature

1. Link, G. K. K., and A. A. Bailey. Fusaria causing bulb rot of onions. Jour. Agr. Res. 33: 929-952. Nov. 15, 1926.

PINK-ROOT CAUSED BY FUSARIUM MALLI TAUB.

This disease was reported from Louisiana, Texas, where 2 per cent loss was estimated, Ohio, and Missouri. A pink root rot of undetermined cause resulted in serious losses where seedlings were grown in infested soil in Orleans and Wayne Counties, New York.

OTHER DISEASES

Alternaria allii Nolla, was reported by J. A. B. Nolla from Porto Rico. He stated that moist weather is most favorable for spread and inoculation.

Aspergillus niger Tiegh., black mold. One per cent loss was estimated in Texas and 2 per cent in Arizona. In the latter state there was much more than usual because of rains preceding and during harvest.

Bacillus carotovorus Jones, soft rot. Caused considerable rotting at base of onions in Nassau County, New York, and in Arizona an estimated loss of 3 per cent was thought to have occurred through reduction in yield and grade.

Caconema radicicola (Greef) Cobb, root knot. Texas.

Colletotrichum sp., leaf anthracnose. In Porto Rico it was estimated by J. A. B. Nolla that 40 per cent of the crop was injured by this disease which was favored by prolonged rainy weather.

Colletotrichum circinans (Berk.) Vogl., smudge. This common disease undoubtedly occurred widely on white onions, although it was actually reported to the Survey only from New York, Indiana, and Porto Rico.

Cuscuta sp., dodder. Texas.

Diplodia sp., slow rot. J. A. B. Nolla of Porto Rico reported this to the Survey for the first time.

Fusarium sp., brittle. Traces prevalent in isolated fields in western New York. Losses negligible (J. G. Gaines)

Fusarium sp., root rot. In Walla Walla County G. L. Zundel found root rot affecting about half of the crop August 25 and causing considerable loss.

Macrosporium sarcinula parasiticum Thuem., black stalk rot, was more prevalent than usual in New York, according to J. G. Gaines. It became most prevalent during August after tops had been attacked by peronospora. Reported also from New Jersey, Florida and Wisconsin.

Macrosporium porri Ell., mold. Found in seed fields in Indiana and Wisconsin preventing maturity of heads. In Porto Rico also it was said to have been common.

Recent Literature

1. Hansen, H. N. Pink root of onions caused by Phoma sp. Science 64: 525. Nov. 26, 1926.

2. Nattras, R. M. White rot disease of onions - immunity trials. Jour. Bath & West & South Co. Soc. Agr. 20: 177-178. 1926.

3. Walker, J. C. The influence of soil temperature and soil moisture upon white rot of Allium. Phytopath. 16: 697-710. Oct. 1926.

DISEASES OF CRUCIFERS

CABBAGE

YELLOWS CAUSED BY FUSARIUM CONGLUTINANS WOLL.

Yellows has been reported generally in the eastern part of the country except in the extreme north, and occasionally outside of this area. In 1926 it was reported from all of the states, excepting Pennsylvania and Michigan, included between New York, Minnesota, Nebraska, Kansas, and North Carolina, and

from Texas. Only two states, Iowa and Tennessee, reported it to be of more than average importance; in most states there was about the usual amount; while Indiana, Illinois, Minnesota, and Missouri reported less. Yellows was not reported at all from the infested region of southeastern Michigan, the weather being too cool for its development there. The highest estimated state loss, 30 per cent, was reported from Iowa. Other loss estimates received were 10 per cent in Kentucky and Missouri, 8 per cent in Maryland, Texas, and Kansas, 5 per cent in West Virginia and Tennessee, 1.5 per cent in North Carolina, and a trace in New York. The loss in Kentucky was in home gardens, the use of resistant varieties preventing any damage to the commercial crop.

During the year three new yellows-resistant midseason varieties of cabbage were reported by the Wisconsin station (7), namely, All Head Select, Globe, and Marion Market, selected from All Head Early, Glory of Enkhuizen, and Copenhagen Market, respectively. A strain of Copenhagen Market, known as Iacope, which has been bred for yellows-resistance but is somewhat later than the earliest strains of the parent variety and also less uniform as to type, has been developed at the Iowa station by a new method of seedbed selection for resistance and seed stock propagation in the greenhouse. (1,4). During 1924 and 1925 it produced a marketable crop on badly infested soil.

Recent Literature

1. Erwin, A. T. The development of a yellows resistant strain of early cabbage for the corn belt. Minn. Hort. 54 (1): 20-22. 1926.

2. Jones, L. R. Science helps grow truck crops; disease resistance developed from Wisconsin experiments. Wisc. Agr. 50: 181, 204. Feb. 13, 1926.

3. Jones, L. R. James Johnson, and James G. Dickson. Wisconsin studies upon the relation of soil temperature to plant disease. Wisconsin Agr. Exp. Sta. Res. Bul. 71: 1-144. Nov. 1926.

4. Melhus, I. E., A. T. Erwin, and F. van Haltern. Cabbage yellows, caused by Fusarium conglutinans, in Iowa. Iowa Agr. Exp. Sta. Bul. 236: 187-216. June 1926.

5. Tims, E. C. On the nature of resistance to cabbage yellows. Jour. Agr. Res. 32: 183-199. Jan. 15, 1926.

6. Tims, E. C. The influence of soil temperature and soil moisture on the development of yellows in cabbage seedlings. Jour. Agr. Res. 33: 971-992. Nov. 15, 1926.

7. Walker, J. C. Three new yellows-resistant midseason cabbage varieties. Seed World 20 (14): 15. Dec. 31, 1926.

Cabbage - Black Rot; Blackleg; Clubroot.

BLACK ROT CAUSED BY BACTERIUM CAMPESTRE (PAM.) EFS.

Black rot has been reported throughout most of the country, except some of the western states, but is most important in the eastern half. In 1926 reports were received from 21 states, all in the region from the Great Plains eastward. For the country as a whole it seems to have been of about the usual importance, six states reporting the average amount, six more, and six less. Rather heavy losses occurred in some localities. Beach reported 25 per cent loss to cruciferous crops, of which cabbage was most important, in the South Philadelphia section of Pennsylvania. Black rot was said to be the most important cabbage disease in Nebraska, where infections of as much as 85 per cent occurred. Ten per cent loss was reported from West Virginia, 5 per cent from Missouri, 1 per cent from Iowa and Texas, and a trace from New York and South Carolina. McWhorter stated (May 31) that black rot was very inconspicuous in the Norfolk section of Virginia where it is usually considered of great importance. In New York, according to Barrus, seed treatment for black rot and blackleg is becoming commonly practiced, which may partially account for the small loss in the state.

BLACKLEG CAUSED BY PHOMA LINGAM (TODE) DESM.

In past years blackleg has been reported to the Survey from all the states between Massachusetts, Minnesota, Louisiana and Florida, from Colorado, and occasionally from 4 or 5 additional states. All of the 18 states reporting the disease in 1926 were within the usual range. In 8 of these there was the average slight or moderate amount, in 2 less, and in one more. The coastal plain area of Georgia, the one state reporting more than usual, experienced its first epiphytotic of blackleg this year. A loss of 7 per cent was estimated for that section. Other losses reported were 1 to 3 per cent in New York, 2 per cent in North Carolina, and 1.5 per cent in Maryland.

CLUBROOT CAUSED BY PLASMODIOPHORA BRASSICAE WOR.

Clubroot has been reported from most states, but causes losses only locally or occasionally and is not of general importance. It is most prevalent in the eastern part of the country, especially in the north. In 1926 reports were received from Connecticut, New York, New Jersey, Maryland, North Carolina, Ohio, Michigan, Wisconsin, Minnesota, Iowa, and Oregon. Barrus reported that in New York it was more abundant and general than for several years. There was more than usual in Wisconsin also where spread from infected seedbeds resulted in total loss in some cases. In most other states there was about the usual amount. Loss estimates given are 1.5 per cent in North Carolina, 1 per cent in Ohio, and a trace in Missouri and Oregon.

Recent literature:

1. Vaughan, R. E., and F. L. Wellman. Club root of cabbage. Wisconsin Agr. Exp. Sta. Circ. 200: 1-3. 1926.

DAMPING-OFF AND WIRE STEM CAUSED BY CORTICIUM VAGUM BERK. & CURT.

Wire stem was reported from New York, New Jersey, and Kansas. According to R. P. White, the disease had not previously been found in the seed bed in Kansas. Connecticut and South Carolina reported damping-off due to this organism. An interesting statement by J. S. Gardner of Kentucky, regarding control of damping-off, is given here, although he does not mention the cause of the trouble.

> "Much trouble is experienced by gardeners, in frames, of course. The standard formaldehyde drench is proving effective. So is a 1-1000 mercuric chloride drench applied (as an emergency) just before seeding. One co-operator 'killed his ground' by using it at the rate of 10 gallons per 4 x 6 foot sash (5 times recommended), but things became normal when he sprinkled the plants with 1 gallon of water plus 1 tablespoonful of sodium nitrate, 2 applications 2 weeks apart. He had perfect control of damping-off." (May 18)

A head rot due to Rhizoctonia was reported by G. B. Ramsey, who stated that it was new in his experience. He found it at Bradentown, Florida, in May, on heads left standing in the field after harvesting. Isolations made from two or three heads gave pure cultures of Rhizoctonia in each case. The Survey has one other report of Rhizoctonia head rot of cabbage, from Philadelphia County, Pennsylvania, where it caused a loss of 7 per cent in 1922, according to W. S. Beach.

DOWNY MILDEW CAUSED BY PERONOSPORA PARASITICA (PERS.) D BY.

Downy mildew was reported, mostly as local or scattered in occurrence, from New York, New Jersey, Florida, Louisiana, and Texas. In New Jersey it was reported May 27, from Paterson, Passaic County, where there was 100 per cent infection in plant beds. Aeration and witholding of water checked its advance (Dept. Plant Path.). In Texas downy mildew was very prevalent on early cabbage, and caused a loss of 3 per cent. (Taubenhaus)

Recent Literature

1. Gäumann, E. Ueber die Spezialisierung des falschen Mehltaus (Peronospora brassicae Gm.) auf dem Kohl und seinen Verwandten. Landw. Jahrb. Schweiz, 40: 463-468. 1926.

2. Thung, T. H. Opmerkingen ober Peronospora parasitica op kool. (Bemerkungen über die Kohl-Peronospora). Tijdschr., Plantenz. 32: 161-179. June 1926.

3. _____ Peronospora parasitica (Pers.) De By. attacking cabbage heads. Phytopath. 16: 365-366. May 1926.

OTHER DISEASES

Alternaria brassicae (Berk.) Sacc., black leafspot. New York, New Jersey, southern Georgia, Florida and Mississippi.

Bacterium maculicolum McCul., bacterial leafspot. Nassau County, New York (Long Island).

Caconema radicicola (Greef) Cobb, root knot. Southern Georgia, Texas.

Cercosporella albo-maculans (Ell. & Ev.) Sacc., leafspot, was reported by O. C. Boyd from southern Georgia as follows: "First observed on January 28, on young cabbage in a garden in which turnip tops were heavily affected with the same disease." The Survey has no other record of the occurrence of this fungus on cabbage, but it has been reported on Chinese cabbage from Connecticut, and is rather generally distributed on white turnip.

Sclerotinia sclerotiorum (Lib.) Mass., drop. Eastern Virginia, Florida, Louisiana.

Sclerotium rolfsii Sacc., southern blight. Southern Georgia, Texas.

Mosaic. A disease reported as mosaic occurred in Nassau County, Long Island. (Barrus)

Wilting due to lightning, Wisconsin.

CAULIFLOWER

Bacillus carotovorus Jones, soft rot. Indiana.

Bacterium campestre (Pam.) EFS., black rot. Local in Pennsylvania, severe where observed (Beach). Slight damage in Missouri. (Archer).

Bacterium maculicolum McCul., peppery leafspot, was reported by Milbrath (in U. S. Bur. Agr. Econ. Fruit & Veg. Div. Letter 8 (2): 18. Jan. 14, 1927) from Compton, Los Angeles County, California. Goldsworthy (1) says that the disease "appears to be of growing economic importance throughout the cauliflower plantings of the San Francisco Bay Region." Also reported from Monmouth County, New Jersey.

Corticium vagum Berk. & Curt., damping-off, occurred in Erie County, New York, in beds treated with mercuric chloride as well as in untreated beds. (Barrus). Uspulun gave good control in a trial at Norfolk, Virginia (McWhorter). One report from Multnomah County, Oregon - 25 per cent of 35,000 seedlings attacked. (Barss)

Peronospora parasitica (Pers.) D By., downy mildew. At Norfolk, Virginia, Uspulun used to check Rhizoctonia damping-off in coldframes, not only controlled that disease but apparently also prevented the development of downy mildew, since none appeared in the treated frames, although it was abundant in neighboring untreated ones. (McWhorter). Downy mildew was also reported from Passaic County, New Jersey.

Plasmodiophora brassicae Wor., club root. Erie County, New York.

Whiptail (due to malnutrition) caused a loss of probably 15 per cent on Long Island. Perfect control was obtained from applications of hydrated lime just prior to setting out the plants. (Clayton)

CRUCIFERS

Recent literature:

1. Goldsworthy, M. C. Studies on the spot disease of cauliflower, a use of serum diagnosis. Phytopath. 16: 877-884. Nov. 1926.

2. Meer, J. H. H. van der. Rhizoctonia-en Olpidium-aantasting van bloemkoolplanten. Tijdschr. Plantenz. 32: 209-242. Aug. 1926. English abst. pp. 235-240.

3. Weimer, J. L. Ringspot of crucifers caused by Mycosphaerella brassicicola (Fr.) Lindau. Jour. Agr. Res. 32: 97-132. Jan. 15, 1926.

AMERICAN BROCCOLI

This plant is not a form of the ordinary broccoli, but is a distinct variety of Brassica oleracea, probably the same as that called asparagus or sprouting broccoli by Bailey in his "Manual of Cultivated Plants." McWhorter sends the following report from Diamond Springs in the Norfolk section of eastern Virginia:

> "This is a relatively new crop here. It is now (November 30) conspicuously affected with Alternaria brassicae (Berk.) Sacc., but with little or no apparent damage. Black rot (Bacterium campestre (Pam.) EFS.) is far more serious on this host."

BROCCOLI

Alternaria brassicae (Berk.) Sacc., leafspot. A severe fall outbreak in the Norfolk section of eastern Virginia (McWhorter).

Bacterium campestre (Pam) EFS., black rot. Pennsylvania; Virginia, Norfolk section, "More severe than I have ever seen it." (McWhorter).

Plasmodiophora brassicae Wor., club root. New York.

BRUSSELS SPROUTS

Phoma lingam (Tode) Desm., blackleg, Long Island, New York. "Loss varies from none to 90 to 100 per cent. The disease is very destructive where it occurs." (Clayton)

CHINESE CABBAGE

Cercospora bloxami Berk. & Br., leafspot, Florida.

Cercosporella albo-maculans Ell. & Ev., leafspot, has been observed for the past 3 years in gardens at the Massachusetts Agricultural College. (Davis, 1).

Recent literature:

1. Davis, W. H. Cercosporella leafspot of Chinese cabbage. (Abstract). Phytopath. 17: 42. Jan. 1927.

2. Wellman, F. L. Occurrence of club root on Chinese cabbage. Phytopath. 16: 310. Apr. 1926.

HORSERADISH

Alternaria brassicae (Berk.) Sacc., leafspot. Missouri.

Alternaria herculea (Ell. & Mart.) Elliott, leafspot. Connecticut, New Jersey.

Cercospora armoraciae Sacc., leafspot. Missouri.

Bacterial leafspot, organism undetermined. "A bacterial leafspot was found, October, 1926, on several large horseradish plants growing in a greenhouse in the District of Columbia. The leaves were heavily spotted with circular to angular lesions, water-soaked and translucent when young, becoming pale brown to yellowish when old. The roots of these plants were sound. Yellow bacteria, similar to, if not identical with, Bacterium campestre, have been isolated from the leafspots and their pathogenicity proved. Field specimens of this disease will be appreciated by Lucia McCulloch, Laboratory of Plant Pathology, Washington, D. C."

Curly top (?), virus. A destructive disease nearly ruined the horseradish industry in a number of places in western Oregon this year, according to McKay and Dykstra, who state that from symptoms and from circumstantial evidence, "We have every reason to believe that this horseradish disease is due to the (sugar beet) curly top virus, and no reason for doubting it." The sugar beet leafhopper was prevalent in the fields. In one locality at Beaverton (Washington), where the yield from 41 acres would normally be 125 tons of roots, 90 to 95 per cent of the plants were affected and the yield would not be more than 30 tons for the entire acreage. Besides this direct loss it is doubtful whether the roots remaining should be used for replanting. McKay estimates a total loss of 75 per cent.

KOHLRABI

Fusarium conglutinans Woll., yellows. Tippecanoe County, Indiana.

MUSTARD

Albugo candida (pers.) Kuntze, white rust. Florida.
Caconema radicicola (Greef) Cobb, root knot. Missouri.
Peronospora parasitica (Pers.) D By., downy mildew. Florida.

RADISH

Actinomyces scabies (Thax.) Güss., scab. Bergen County, New Jersey, on radishes sown in heavily scabbed soil. (Chupp).

Albugo candida (Pers.) Kuntze, white rust. Indiana.

Aphanomyces raphani Kendrick, black root. Kendrick (Phytopath. 17: 43. Jan. 1927) reports that black root is caused by a hitherto undescribed species of Aphanomyces for which he proposes the name A. raphani. Neither Pythium aphanidermatum (Edson) Fitz. nor Aphanomyces euteiches Drechsler proved to be pathogenic to radishes in inoculation tests.

Corticium vagum Berk. & Curt., stem rot. In market gardens in Missouri, mostly of slight importance, but sometimes severe in spots. (Archer).

Sclerotinia sclerotiorum (Lib.) Massee, New Jersey.

RAPE

Bacterium campestre (Pam.) EFS., black rot. Pennsylvania, Indiana.

TURNIP

Actinomyces scabies (Thax.) Güss., scab. Middlesex County, New Jersey. "All kinds of root crops were planted on a farm that gave very scabby beets in 1925. Apparently the same scab organism attacks many root crops. In an experiment, the average percentage of scab was: Checks, 11.7 on Milan turnip, 9 on Globe. With sulfur 300 pounds per acre, 5 on Milan, 3.8 on Globe. With sulfur 600 pounds per acre, 1.1 on Milan, 3.2 on Globe." (Chupp).

Albugo candida (Pers.) Kuntze, white rust, Florida, Texas.

Bacillus carotovorus Jones, soft rot. Maryland.

CRUCIFERS: CUCURBITS.

Cacoxema radicicola (Greef) Cobb., root knot. Southern Georgia.
Cercosporella albo-maculans (Ell. & Ev.) Sacc., leafspot. Southern Georgia.

Cylindrosporium brassicae Fautr. & Roum., leafspot. Specimens collected by C. A. Ludwig in Anderson County, South Carolina, November 24 were received. This is apparently the first record from this state. The only other report the Survey has is one made by B. B. Higgins from Spalding County, Georgia, in 1915.

DISEASES OF CUCURBITS

MUSKMELON

LEAFBLIGHT CAUSED BY MACROSPORIUM CUCUMERINUM ELL. & ARTH.

Although it probably occurred much more widely, Macrosporium blight was reported it 1926 only from Connecticut, New Jersey, Delaware, Maryland, Virginia, Georgia, Alabama, Texas, Indiana, and Arizona. Percentage losses reported were large in some cases: 30 in southern Georgia, 20 in Texas, 8 in Maryland, 5 in Alabama, 2 to 3 in New Jersey. Some of the comments of collaborators are as follows:

New Jersey: Came late, following heavy rains in August. (Dept. Plant Path.)

Delaware: Mature infection observed July 14. Has spread very rapidly. Copper-lime dusting has proved very effective this season when applied two or three times. Focal points of early infections strongly indicate seed transmission. (Adams, Aug. 15).

Maryland: Dusting for control becoming more prevalent. (Temple & Jehle).

Southern Georgia: Early fields underwent from 5 to 25 per cent loss; late fields from 25 to 75 per cent. (Boyd).

Northern Arizona: Has been present in the majority of fields during the later stages of growth. In general the weather has been dry so there has been little spread of the disease. (H. R. Brisley, Sept. 11).

BACTERIAL WILT CAUSED BY BACILLUS TRACHEIPHILUS EFS.

Bacterial wilt of cucurbits occurs generally from the Great Plains eastward, and has been reported occasionally outside of this area. In 1926 it

apparently was mostly of slight importance on muskmelon. Reports of its presence were received from Connecticut, Maryland, Alabama, Louisiana, Ohio, Indiana, and Missouri. Losses estimated were 3 per cent in Indiana, 0.2 per cent in Maryland, and traces in Alabama and Missouri. According to E. C. Tims, the disease was quite destructive in some small plantings in Louisiana.

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LAGENARIUM (PASS.) ELL. & HALS.

Anthracnose, which is of general occurrence from the Great Plains eastward, was reported in 1926 from New York, New Jersey, Maryland, Alabama, Ohio, Illinois, Michigan, and Wisconsin. The highest loss reported was 5 per cent from Michigan, where, according to Nelson, anthracnose was the most important leaf disease of the crop. In Alabama the disease was said by Miles to be locally destructive, causing as much as 50 per cent loss in some fields with an estimated loss for the state of 2 per cent. In New Jersey the loss was estimated at a trace to 0.5 per cent, and in Maryland at a trace. G. A. Meckstroth reported from Illinois that, "Near the close of the season, many muskmelons on the market bore numerous cankers; some were literally covered with cankers and were unsalable." The variety Osage was very susceptible, according to Meckstroth.

DOWNY MILDEW CAUSED BY PSEUDOPERONOSPORA CUBENSIS (BERK. & CURT.) ROSTOW.

Downy mildew has been reported generally from the Great Plains eastward, and from California. In 1926 it was reported from Connecticut, Maryland, Georgia, Alabama, Texas, and California. Taubenhaus stated that in Texas the disease was very severe, and in combination with the powdery mildew, almost wiped out the crop in the lower Rio Grande Valley. The loss due to downy mildew was estimated by him at 20 per cent. Other losses reported were one per cent from Maryland and from Alabama, where the disease is most severe near the coast, according to Miles, 0.5 per cent from California, and 0.1 per cent from southern Georgia. Boyd reported from the last-named state: "The combination of moisture-temperature conditions apparently was unfavorable, for the disease was fully a month later than usual (first report this year August 5) in showing up."

MOSAIC (VIRUS)

Mosaic was reported in 1926 from Monroe County, New York, where it was said to be quite severe in greenhouses but not bad in the field, New Jersey, Maryland, the Norfolk section of Virginia, and Indiana, where it caused a loss of 2 per cent. Regarding its occurrence in Virginia, W. W. Gilbert of the Office of Vegetable and Forage Diseases reported as follows:

> "On July 26 F. P. McWhorter of the Virginia Truck Experiment Station and I examined muskmelon crops in several fields north of Norfolk, where an unusual yellowing of the vines, not directly traceable to soil or weather conditions or any known diseases, had occurred in the early part of the season. A spell of extremely hot,

dry weather immediately preceding our visit had caused many of the vines to wilt down so they were in poor condition for examination. A mosaic-like appearance of the vines was found prevalent in portions of the fields near hedges and woods, in the edges of which were numerous plants of pokeweed (Phytolacca decandra), many badly affected with mosaic. The most severely diseased areas in the fields were generally adjacent to these diseased pokeweed plants. Mosaic pokeweeds were found both in and near the coldframes where the melon plants were started, indicating the possibility of very early infection from these sources. Specimens of supposed mosaic muskmelon vines were taken to Washington and inoculations were made on young melon vines in the greenhouse. After about ten days typical mosaic symptoms appeared in some of the inoculated plants."

POWDERY MILDEW CAUSED BY ERYSIPHE CICHORACEARUM DC.

The outstanding fact with regard to powdery mildew in 1926 was the severe outbreak in the Imperial Valley of California. The situation is well summarized in the following quotation from Crops and Markets (July 17).

"According to a review published by the Federal market news reporter at El Centro, commercial yields varied widely on Imperial Valley cantaloupe patches. A few growers, who were favored with ideal soil and cultural conditions and were also able to keep the mildew in partial check, reported very good yields. In some cases, as many as 200 or more crates to the acre were harvested. However, there also were many fields which yielded as low as 80 or 90 crates per acre, or even less, particularly on early patches. The average yield probably was around 110 crates for the Valley as a whole, compared with an average of about 160 crates in most of the past seasons. In many patches, only the crown set was harvested because the vines did not live long after the first picking. If it had not been for the exceptionally heavy crown set, average yields would have been much less than they were.

Last season was the first that powdery mildew caused any serious losses on Imperial cantaloupes. The disease was widespread and serious but was disastrous in only a relatively few patches. This year the fungus attacked cantaloupe plants in almost every field and was very destructive. Prior to last year, the disease was not considered of material consequence to commercial cantaloupe production and, therefore, little work on control measures was done. As a result, growers were unprepared to combat effectively the spread of the parasite this season. Before they realized the seriousness of the situation, the fungus had spread over the entire Valley and had gained such a foothold that control measures in most cases were of little avail. Various dusting materials, mostly containing sulphur in one form or another, were applied to the affected plants. Results were not all encouraging but considerable experimental work was watched by trained observers and they are hopeful that some preventive may be evolved before another season. It is roughly estimated that shipments were reduced 5,000 or 6,000 cars as a direct result of mildew.

"Quality of cantaloupes shipped from the Imperial Valley was generally the poorest of any recent years. A large percentage of the stock was of low sugar content and lacked palatable flavor. Such melons, from mildew-weakened vines, deteriorated rapidly in transit and reports of poor condition on arrival were numerous. Many housewives refrained from buying cantaloupes after a few trials and the effect of this lessened demand was very noticeable during the latter part of the deal, when light supplies did not produce a normal upward reaction in market prices. Because of the substandard quality, the Federal-State inspection service was able to certify only about 5% of the shipments, compared with about 20% last year."

The total loss was estimated by Milbrath at 45 per cent.

Powdery mildew was destructive in several other localities also. Its appearance in the Yuma Valley of Arizona caused alarm to growers, who feared that it might become as severe as it had in the Imperial Valley. It did cause heavy loss, which was reported by Streets as 25 per cent of the crop of the 300 acres grown. In Maricopa County, where the disease appeared for the first time, the loss was 1 per cent on 5500 acres. The total loss for the state was estimated by Streets at 5.2 per cent, of which 2.2 per cent was due to reduction in yield, and 3 per cent to loss in grade. H. R. Brisley reported powdery mildew from the Verde Valley in Yavapai County, which he says is the largest cantaloupe growing section in northern Arizona. It did not appear until late in the season however. On September 11 Brisley reported:

"I have found mildew in practically all fields of cantaloupes for the past two weeks, but as long as the weather stayed dry there was little spread. A few days of rainy weather spread it to a marked degree so that at present in the majority of fields at least 50 per cent of the leaves show decided infection. Just at the time that the disease was becoming severe a very disastrous hail storm visited the main cantaloupe growing section and so leveled the vines that the amount of injury from mildew could not be appreciated."

In a report from Texas, Taubenhaus said:

"The powdery and downy mildews of cantaloupes were exceedingly bad this year in the lower Rio Grande Valley. In fact they wiped out the entire crop there and not a single car was shipped. The discouraging part about it is that we have as yet no fungicide that we can use that does not burn the foliage."

A loss of 15 per cent for southern Georgia was estimated by Boyd who stated that, "Ordinarily this is more of a 'dry weather' disease here, but this year it became severe during the middle of July when there was moderate rainfall."

Recent literature:

1. Jagger, I. C. Powdery mildew of muskmelons in the Imperial Valley of California in 1925. Phytopath. 16: 1009-1010. Dec. 1926.

OTHER DISEASES

Bacillus carotovorus Jones, soft rot. New Jersey - The melons cracked, due to extremely wet weather. Seventeen to 26 per cent of infection(B. carotovorus ?) was found in the experimental plots on the College Farm. Bordeaux sprays and copper dusts seemed to hold it in check. (Dept. Plant Path.). Also reported from Maryland.

Caconema radicicola (Greef) Cobb, root knot, was reported from Soutn Carolina, southern Georgia, Texas, Arizona, and California. Estimates of loss were 8 per cent in southern Georgia, 1 per cent in Texas, 0.2 per cent in California. H. R. Brisley reported from northern Arizona (July 14), "Root swellings formed much earlier than usual, so that in many instances crops have never reached the bearing age. Found mainly in fields where truck crops have been grown for several years consecutively."

Cercospora sp., leafspot. Colorado - one report.

Cladosporium cucumerinum Ell. & Arth., scab. New Jersey.

Fusarium sp., fruit rot. Maryland - follows skin cracking; 1 per cent loss. (Temple & Jehle)

Pythium debaryanum Hesse, damping-off. Connecticut - one report, in greenhouse. McClintock)

Rhizoctonia sp., damping-off. New Jersey - A few growers complain that they lose many hills because of damping-off. (Dept. Plant Path.)

Sclerotium rolfsii Sacc., southern blight. Texas, 1 per cent loss.

Chlorosis due to excess of lime. Texas.

Curly-top (?). Cantaloupe is one of the hosts which was affected by a disease believed to be due to the virus of sugar-beet curly top in western Oregon, although this has not been proved. (McKay & Dykstra).

C U C U M B E R

BACTERIAL WILT CAUSED BY BACILLUS TRACHEIPHILUS EFS.

In 1926 bacterial wilt was reported on cucumber from Connecticut, New York, New Jersey, Maryland, Georgia, Texas, Indiana, Missouri, and Nebraska. Evidently it was generally of slight importance, the largest loss reported being 2 per cent from Texas. E. E. Clayton estimated the loss on Long Island as perhaps 5 to 10 per cent. Boyd reported a loss of 0.1 per cent for southern Georgia, and stated, "Only one severe case was noted, in Mitchell County, where 50 per cent of the hills showed wilting plants. Spotted cucumber beetles were present in abundance."

S. Marcovitch, of the Tennessee Station, has reported on the control of the cucumber beetle by the use of sodium fluosilicate. (Marcovitch, S. The control of the striped cucumber beetle. Tennessee Agr. Exp. Sta. Circ. 1, pp. 2, 1926.)

CUCURBITS

ANGULAR LEAFSPOT CAUSED BY BACTERIUM LACHRYMANS EFS. & BRYAN

Angular leafspot occurs mostly east of the Great Plains, although it has been found in Colorado and California. In 1926 it was reported from Connecticut, Delaware, Georgia, Florida, Kansas, and, for the first time, from Oregon. The disease was found in an old planting at Salem, and a specimen received from F. D. Bailey was identified in the Office of Vegetable and Forage Diseases as Bacterium lachrymans.

The only loss estimate reported was 0.5 per cent in southern Georgia.

MOSAIC (VIRUS)

Mosaic is an important disease in most of the commercial cucumber growing sections and is the limiting factor in some regions. In 1926 it was reported from Connecticut, New York, New Jersey, Maryland, Texas, Indiana, Wisconsin, Missouri, and Nebraska, and also from Manitoba, Canada. The loss in some fields in Wicomico County, Maryland was as much as 85 to 90 per cent; the total loss for the county was probably 50 per cent, and for the state 6 per cent, accordingly to Jehle. The loss in Indiana was estimated at 5 per cent. Some of the reports from collaborators follow:

> New York: Long Island - This disease has reduced crops by 50 to 75 per cent in the previous three years. This year it caused perhaps a 15 to 25 per cent loss. (Clayton)
>
> Nassau County - Present in all plantings, not so serious as in previous years. Monroe County - Is quite severe in greenhouses but not so bad in field. (Barrus)

> Maryland: White pickle found very bad in Wicomico County. Some fields showed all of the cucumbers affected and every field examined had some. The disease could be traced to infected pokeweeds along the edges of the fields and was more severe near the pokeweeds than farther from them. Fields near woods or waste land showed more than those in the open and removed from localities where pokeweeds were growing. (Jehle, July 10)

> Manitoba: Everywhere around Winnipeg, and very virulent. First evident about a week ago, just as fruit was getting well formed. Has occurred here for the past five to seven years only Apparently not yet present elsewhere in Manitoba than the Winnipeg area. (Bisby, Aug. 12).

Wild host plants are an important factor in the severity of this disease, and their eradication reduces damage greatly, according to Doolittle and Walker (2, 3). Elmer (4) reports a mosaic resistant variety, "Chinese Long", obtained from China. This is an entirely different type of cucumber from that grown in this country. Walker (6) reports the results of a comparative study of the mosaic diseqses of cucumber, tomato, and ground cherry, from which he concludes, "These experiments have shown that the properties of the mosaic virus of a given

plant may be decidedly changed by transferring it to another host. The properties of the viruses from mosaic plants of a certain species also appear to be the same, no matter what the source of infection. This fact indicates that there may be a single causal agent for all the mosaic diseases studied here."

Recent literature:

1. Bewley, W. F. Mosaic disease of the cucumber. Ann. Rep. Exp. & Res. Sta. Nursery & Market Gard. Industr. Devel. Soc. 11: 86-89. 1926.

2. Doolittle, S. P., and M. N. Walker. Control of cucumber mosaic by eradication of wild host plants. U. S. Dept. Agr. Bul. 1461: 1-15. Nov. 1926.

3. Doolittle, S. P., and M. N. Walker. Investigations of cucumber mosaic during 1915-1924 for the National Pickle Packers' Association. Fruit Prod. Jour. 6 (3): 20-22. Nov.; (4): 21-23. Dec. 1926.

4. Elmer, O. H. A mosaic resistant variety of cucumbers. (Abstract). Phytopath. 17: 48. Jan. 1927.

5. Johnson, James. Mosaic diseases on differential hosts. Phytopath. 16: 141-149. 1926.

6. Walker, M. N. A comparative study of the mosaic diseases of cucumber, tomato, and Physalis. Phytopath. 16: 431-458. July, 1926.

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LAGENARIUM (PASS.) ELL. & HALST.

Anthracnose has been reported east of the Great Plains, and from Colorado, Arizona, and California. In 1926 what is apparently the first report of its occurrence in Oregon was received. Barss stated that it was serious in a single greenhouse at Ashland. Other states reporting it were Massachusetts, New York, Delaware, Maryland, Florida, and Nebraska.

DOWNY MILDEW CAUSED BY PSEUDOPERONOSPORA CUBENSIS (BERK. & CURT.) ROSTEW.

Downy mildew was reported from Connecticut, Maryland, South Carolina, Florida, and by W. A. Orton from Cuba. A loss of 0.5 per cent was estimated in Maryland. In Florida, according to Weber, there was less than for the last five years, and it was rare until late in the season.

OTHER DISEASES

Cacenoma radicicola (Greef) Cobb, root knot, caused losses estimated at 10 per cent in southern Georgia and 1 per cent in Texas, and was also reported from Florida, Missouri, and Arizona (see note under muskmelon).

Choanephora cucurbitarum (Berk. & Rav.) Thax., brown rot. Florida.

Cladosporium cucumerinum Ell. & Arth., scab, Maine, New York, Wisconsin. New York - General in western New York; loss 2 to 3 per cent. The Secretary of the Erie County Growers and Shippers Association reports an average loss of 5 per cent to their growers. Very destructive in two or three greenhouses in Monroe County. (Barrus). Wisconsin - Losses vary. Especially bad where rains have been heavy. (Vaughan).

Erysiphe cichoracearum DC., powdery mildew. Massachusetts - Common in greenhouses. (Guba). New York, Long Island - This is the first year that I have seen this disease severe in this locality. Loss probably 20 to 25 per cent. (Clayton). Southern Georgia - Unusually prevalent in July and August; loss 5 per cent. (Boyd). Florida - Worst in last five years. (Weber). Also reported from Delaware.

Macrosporium cucumerinum Ell. & Ev., leafblight. New Jersey, Maryland - 2 per cent loss.

Pythium spp., damping-off, root rot. New Jersey, Connecticut, Virginia.

Curly-top (?). Cucumbers in western Oregon were observed to be affected with a disease believed, but not proved, to be due to the sugar-beet curly top virus. (McKay & Dykstra). Heald and Dana state that in Washington heavy losses of cucurbits, especially squashes and cucumbers, were caused by a disease somewhat similar to the western yellow blight of tomato reported by McKay and Dykstra to be due to the curly top virus. (See tomato western yellow blight, page 257).

PUMPKIN

Leafspot caused by Cercospora sp., powdery mildew caused by Erysiphe cichoracearum DC., and downy mildew caused by Pseudoperonospora cubensis (Berk. & Curt.) Rostow., were reported from Indiana.

Bacterium cucurbitae Bryan, bacterial leafspot. Maryland (See squash).

SQUASH

Bacillus carotovorus Jones, soft rot. Maryland.

Bacillus tracheiphilus EFS., bacterial wilt. New Jersey, Maryland.

Bacterium cucurbitae Bryan, bacterial leafspot. This disease, originally described by Miss Bryan from New York material (1), has been found in Maryland also. Miss Bryan makes the following statement:

"Since the publication of a note in Science of February 5, 1926, the bacterial spot of Hubbard squash has been found in the field in Maryland and in the District of Columbia, on Hubbard squash, Boston Marrow, pumpkin, and Yellow Crookneck summer squash, Italian summer squash, and watermelon. There has been no evidence of insect transmission although aphids, squash bugs, and striped cucumber beetles were present on infected plots. Spread of the disease is rapid following rains, causing progressive defoliation. No fruit infection has been observed. The spots, unlike those of angular leafspot of cucumber, do not tear out but coalesce into large brown areas, often involving the whole leaf. A pronounced yellow halo around large and small spots is characteristic. Information and specimens indicating occurrence of the disease in other states are desired."

Caconema radicicola (Greef) Cobb, rootknot. Maryland, Texas, Arizona. A loss of 1 per cent was reported from Texas.

Erysiphe cichoracearum DC., powdery mildew. Connecticut, Arizona.

Fusarium sp., wilt. Texas, loss 1 per cent.

Pseudoperonospora cubensis (Berk. & Curt.) Rostew., downy mildew. Florida.

Pythium aphanidermatum (Edson) Fitz., cottony leak. Maryland (Drechsler & Whitney).

Pythium sp., and Rhizoctonia solani Kuhn, rot. Isolated by Drechsler from rotted squash received from Pennsylvania.

Curly top (virus), reported by McKay and Dykstra (2) to be due to the sugar-beet curly top virus and to be transmitted by the sugar-beet leafhopper, was severe in many places in Oregon, Washington, and Idaho, causing general failure of squash. It had not been observed on squash prior to 1926. In Oregon McKay estimates the loss at 75 per cent. East of the Cascades the loss was probably 90 per cent; west of them it was 90 per cent in Multnomah County, 60 per cent in Washington County. A cannery at Forest Grove lost 600 tons. The disease occurred throughout the state except on the coast. All varieties noted were susceptible, including Boston Marrow, Green Hubbard, Summer Crookneck, Mammoth White Bush Scallop, and Silver Skin.

Mosaic (virus). Texas, Indiana.

Recent literature:

1. Bryan, Mary K. Bacterial leafspot on Hubbard squash. Science n. s. 63: 165. Feb. 5, 1926.

2. McKay, M. B., and T. P. Dykstra. Curly-top of squash. (Abstract). Phytopath. 17: 48-49. Jan. 1927.

CUCURBITS

WATERMELON

ANTHRACNOSE CAUSED BY COLLETOTRICHUM LAGENARIUM (PASS.) ELL. & HALST.

In 1926, according to the reports received, anthracnose was considerably more prevalent than usual, and also more prevalent than in 1925. Delaware and Illinois report much more than usual; West Virginia and Alabama more; and Maryland and Georgia the average amount. The disease was said to be destructive in central and eastern Texas. There was said to be much less than usual in Florida and less in Arizona. A loss of 25 per cent was reported from West Virginia; 20 per cent, divided equally between reduction in yield and loss in transit, in southern Georgia; 1 per cent reduction in yield and 9 per cent loss in transit in Maryland; 10 per cent in Alabama; 3 per cent in Texas; and a trace from Missouri.

Most reports mention favorable weather conditions. Some of the reports follow:

Delaware: First infection observed on leaves July 21. Evidence indicates it will be a troublesome disease this season. Heavy rains in July have favored its early establishment. (Adams, Aug. 15).

West Virginia: More than usual. Wet and hot in midsummer. (Sherwood).

Southern Georgia: Caused most injury late in season. Combination of temperature and moisture favorable only during latter half of shipping season. (Boyd).

Alabama: More serious than last year. Apparently much seed sold is infected. (Miles).

Illinois: General; much more than usual, most injury late in season. Almost daily rains for several weeks. One field near Peoria was a total loss, on ground that had never before been planted to watermelons. The leaves were nearly all spotted and nearly all the melons had many cankers. Evidently a case of seed transmission. (Meckstroth).

Recent literature:

1. Boyd, O. C. Further experiments in the control of watermelon anthracnose with dusts and sprays. (Abstract). Phytopath. 16: 641-642. Sept. 1926.

WILT CAUSED BY FUSARIUM NIVEUM EFS.

Fusarium wilt of watermelon occurs in most commercial melon-growing

sections, but is most prevalent in the South. In 1926 it was reported from eleven states east of the Mississippi from Maryland to Illinois southward, and from Missouri and Arizona. Losses were high in some cases. Archer estimated 20 per cent for Missouri, and stated that, "Several thousand acres were lost in southeastern Missouri this season the disease is evidently becoming more serious each year." In West Virginia the development of wilt was favored by the dry and hot spring, and it caused a loss of 10 per cent, according to Sherwood. G. A. Meckstroth reported that in Illinois, "The watermelon acreage in the older sections is now only about one-fifth of what it used to be; the wilt has forced a good many growers to abandon the growing of watermelons. This applies especially to the sandy sections along the Kankakee, Illinois, and Wabash Rivers." The disease was destructive locally in some other states. Besides those already given, the loss estimates received are, 1.5 per cent in Georgia, 1 per cent in Alabama and Texas, and a trace in Maryland.

The following observations regarding susceptibility of varieties were reported:

Southern Georgia: All varieties common here are susceptible. (Boyd).

Illinois: Conqueror proved resistant in some localities and wilted in others. (Meckstroth).

Missouri: Irish Gray, Tom Watson, Thurmond Gray are the three principal varieties grown. Thurmond Gray seems to be most resistant. (Archer).

In some 4,700 isolations from watermelon vines infected with Fusarium niveum, Porter (1) obtained the fungus from all parts of the plant, including the fruit and probably the seed. He reports that Fusarium niveum pathogenic to watermelon seedlings was isolated from citron vines, which are supposedly immune; and that it was obtained from watermelon vines, apparently healthy, grown on land that had never before produced watermelons; and that it appears to remain alive in soil where watermelons have not been grown for at least 16 years.

Recent literature:

1. Porter, D. H. Watermelon wilt infection studies. (Abstract). Phytopath. 17: 47-48. Jan. 1927.

OTHER DISEASES

Bacillus tracheiphilus EFS., bacterial wilt. New York, Tennessee Missouri.

Caconema radicicola (Greef) Cobb, root knot. Georgia, Texas, Arizona. Southern Georgia - Loss 5 per cent. Watson, Thurmond Grey, Thomas, susceptible. (Boyd). Texas - loss .5 per cent.

Capnodium sp., honeydew. Texas.

Cercospora citrullina Cke., leafspot. Georgia, Florida, Louisiana, Texas. A loss of 5 per cent was reported from Texas.

CUCURBITS

Diplodia sp., rot. Stem-end rot, Maryland, Georgia, Texas, Missouri. Southern Georgia - Frequent rains during shipping season favored infection in field after cutting. Reduction in yield a trace; loss in transit, 3 per cent. (Boyd). Maryland - loss 1 per cent. (Temple & Jehle). Associated with blossom-end rot, Georgia.

Erysiphe cichoraceaarum DC., powdery mildew. Georgia, Arizona.

Mycosphaerella citrullina (C. O. Smith) Gross., gummy stem blight. Florida, Alabama, Arizona. Alabama - Observed for first time in state this year in Cullinan, Blount, and Elmore Counties. Northern Arizona - This is the first year that the disease has become apparent in this region. A field of one-half acre in Oak Creek Valley was found to have 15 per cent of the vines showing definite symptoms. Another field of one acre in the same locality had 5 per cent of the plants diseased. (Brisley, July 14).

Pseudoperonospora cubensis (Berk. & Curt.) Rostow., downy mildew. South Carolina, southern Georgia, Florida.

Sclerotium rolfsii Sacc., ground rot. Southern Georgia - Frequent warm rains in early July very conducive. Common in almost all fields. Reduction in yield a trace, loss in transit 3 per cent. Thurmond Gray susceptible, Watson and Thomas very susceptible. (Boyd). Also reported from Florida.

Blossom-end rot (non-par.). Southern Georgia - Followed by Sclerotium sp., Diplodia sp., Pythium sp. Less prevalent than in 1925; there was no abrupt breaking of drouth in 1926 as in 1925. Reduction in yield 1 per cent, loss in transit 1 per cent. (Boyd). Alabama - General but not so severe as last year. Less probably 2 per cent. (Miles). Texas - loss 4 per cent. (Taubenhaus). Missouri - Phoma associated in a specimen sent by Archer, determined by W. W. Gilbert.

Internal browning (non-par.). Kansas - In Manhattan trucking district. Very dry at time of maturity of melons, and temperature high, causing rapid transpiration. Reduction in yield a trace; loss in transit, 5 per cent. Monte Cristo immune, Irish Gray resistant, Tom Watson susceptible, Thurmond Gray very susceptible. (White.)

Mosaic (?). A disease reported by Brisley as mosaic was stated by him to be unusually serious this season in northern Arizona. It was found to some degree in every field examined. In some fields as high as 50 per cent of the plants showed decided infection. Without exception these plants were practically devoid of marketable melons.

Recent literature:

1. Cardwell, G. A. Spraying and harvesting the watermelon crop. Florida Grow. 33 (19): 7, 13. May 8, 1926.

2. Ensign, M. R. To spray or not to spray. Florida Grow. 33 (11): 28-29. Mar. 13, 1926.

DISEASES OF CELERY

EARLY BLIGHT CAUSED BY CERCOSPORA APII FRESENIUS

In 1926 early blight of celery was reported from the region included between Connecticut, Michigan, Indiana, and New Jersey and Delaware, and from North Carolina, Florida, Texas, Missouri, and California. For the most part it did not seem to be very important. In Long Island, Delaware, and Ohio there was more than usual, otherwise there was the average amount or less. The highest loss reported was 5 per cent from Ohio, where, according to J. D. Wilson, excess moisture was favorable to the disease in spite of low temperatures. Other losses estimated were 1 to 2 per cent in Pennsylvania, .02 per cent in California, and traces in New York, Michigan, Missouri, and Texas. Some of the remarks of collaborators regarding control, varietal susceptibility, weather relations, etc., follow:

New Jersey: Abundant in all unsprayed fields in south Jersey. Copper-lime dust failed to control while good results followed the use of Bordeaux mixture. (Dept. Plant Path.)

Pennsylvania: All varieties susceptible, Golden Plume very susceptible. (Beach).

Delaware: Giant Pascal and Winter Queen more susceptible than White Plume. (Adams).

Michigan: Not important but noted in nearly all fields at Kalamazoo and Muskegon. Very dry and cool summer unfavorable for the development of the fungus. (Nelson).

Missouri: Spraying is necessary in market gardens for good product. (Archer).

LATE BLIGHT CAUSED BY SEPTORIA APII ROSTR.

Late blight was reported in 1926 from Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Virginia, Florida, Ohio, Indiana, Illinois, Michigan, California, and Oregon, and also from Ontario and Manitoba. Losses reported were 30 per cent in Ohio; 15 per cent in the Philadelphia district, Pennsylvania; 10 to 15 per cent in Michigan; and 2 per cent in New York and California. Some of the reports of collaborators follow:

Pennsylvania: Easy Bleaching susceptible, Golden Plume very susceptible. Great variation in the severity of the disease in different fields. Control work by spraying is improving. (Beach).

Ohio: Severe in northern Ohio. Excessive rains very favorable to the disease. (J. D. Wilson).

Michigan: In the Kalamazoo district caused 30 to 50 per cent loss in the late crop, in the Muskegon district 25 per cent loss. In the Hudsonville and Decatur districts where only one crop is grown the disease has caused only minor losses. Spraying and dusting are practiced more regularly in these celery regions than at Kalamazoo or Muskegon. The summer was very dry so that Septoria did not develop to any extent until September and later. Low temperature and excessive rainfall have provided the necessary conditions for rapid development of the fungus in the winter crop. (Nelson).

Oregon: Apparently general in western Oregon wherever celery is grown. Readily controlled but serious where not controlled. (Barss).

OTHER DISEASES

Bacillus carotovorus Jones, heart rot. Connecticut, Washington.

Bacterium apii Jagger, bacterial blight. New York, Michigan, North Dakota. Losses reported were 1 to 2 per cent in Michigan and a trace in New York.

Caconema radicicola (Greef) Cobb, root knot. Florida.

Fusarium sp., yellows. New Jersey - Found in several cold frames, severe in some instances. (Chupp). Michigan- In general the season has been unfavorable for the development of this disease. Temperature below normal throughout the entire summer. Yellows developed in a number of fields in the Muskegon district in June and these fields were replanted with resistant varieties. In trials at Kalamazoo plantings of susceptible varieties on sick soil developed no signs of the disease during the summer. In Colorado where yellows caused serious losses in some fields the Michigan State College yellows- resistant strain of Golden Self Blanching gave very satisfactory results. Golden Self Blanching and all yellow varieties are susceptible. (Nelson). A disease resembling yellows in some respects developed during the latter part of November in fields near Chula Vista, California, according to Milbrath, who states that a Fusarium was isolated from the roots. (U. S. Dept. Agr. Bur. Agr. Econ. Fruit & Veg. Div. Letter 8 (2): 18. Jan. 14, 1927).

Sclerotinia minor Jagger, pink rot. An occasional plant in a 42-acre field at Bridgeton, New Jersey. (Dept. Plant Path.).

Sclerotinia sclerotiorum (Lib.) Mass., pink rot, was reported from Virginia, Florida, Michigan, and California. Michigan - Late rains favored the development of this trouble and much celery was rotted in trenches and in transit, causing a loss of 25 per cent. (Nelson). California - loss 0.3 per cent. (Milbrath).

Black heart (undet.). Florida - More than usual, heavy rains during March after prolonged drought. Meisek's Special very resistant, the old Golden Self Blanching susceptible. Control on basis of proper irrigation, and drainage during excessive rainfall. (Foster). California - loss 0.3 per cent. (Milbrath).

Cracked stem (non-par), as described with illustrations, in Florida Station Bulletin 173, page 58, was reported in New York for the first time. The County Agent of Oswego County sent in specimens. In addition to cracking of

back of stalk, there was a cracking and browning of the inside even on the very young leaves at the center of the bunch. One grower in Steuben County has had the trouble every year." (Barrus).

Curly top (?). Celery was one of several plants affected by a disease believed to be due to the virus of sugar-beet curly top, in western Oregon. (McKay and Dykstra).

Marl disease (undet.). Michigan - In Manchester district this is an important disease. Did not develop in 1925, but reappeared this year, ruining some fields of late celery. The cause of this disease has not yet been established, although it is thought to be in some way related to high soil alkalinity. (Nelson).

Mosaic (virus). Caused a trace of loss in California, also reported from Florida.

DISEASES OF LETTUCE

Bacillus carotovorus Jones, soft rot. Connecticut - One report of severe injury to Big Boston. (Clinton).

Bacterium vitians Brown, bacterial wilt. South Carolina - Found on three acres near Beaufort causing about 3 per cent loss. (Moore).

Botrytis sp., gray mold rot, was reported from New York, New Jersey, Pennsylvania, North Dakota, Kansas, and California. Pennsylvania - Loss about 8 per cent in the Philadelphia section. (Beach). Kansas - In greenhouses at Neodesha, on leaf lettuce. First report from this state, at least on leaf lettuce. (White). California - Botrytis enters tip-burned tissue and causes a rapid rot of the head. Variety New York susceptible. (Rawlins).

Botrytis sp., stem girdle. New York - Formerly thought to be bacterial. In Elba County, according to E. L. Felix, it reduced the stand in several fields greatly. In a few fields it was observed to begin on one side and destroy all the plants in several rows. Moisture seems to favor it. (Barrus).

Bremia lactucae Regel, downy mildew. Oregon - Considerable mildew present on 30,000 seedlings grown near Corvallis. (Barss). California - Loss 0.3 per cent. (Milbrath). Also reported from New York and Florida.

Corticium vagum Berk. & Curt. Bottom rot caused a loss of 5 per cent in New York, according to Barrus, and was reported also from Missouri, in greenhouses. Barrus reports a stem rot from Suffolk County, New York, as follows, "Caused probably by a different strain of Rhizoctonia than the one causing bottom rot. After the seedlings had been set a week or more, affected plants rotted around the stem at surface of the ground and then withered and died. Ten per cent affected." Basal stem rot occurred in Connecticut.

Marssonina panattoniana (Berl.) Magn., anthracnose. Florida.

Ozonium omnivorum Shear, root rot. Texas.

Pythium sp., damping-off. South Carolina.

Sclerotinia sp., drop. Oregon.

Sclerotinia minor Jagger, drop. New Jersey - One field observed showing 5 per cent in wet spots, 1 per cent in the remainder of the field. The field had not been in lettuce for five years, disease severe previous to that time. (Dept. Plant Path.).

Sclerotinia sclerotiorum (Lib.) Mass., drop. New York, New Jersey,

Pennsylvania, Delaware, South Carolina, Florida, Louisiana, Missouri, Kansas, Washington, California. Losses reported were 5 per cent in greenhouses in Missouri, 2 per cent in South Carolina, 0.3 per cent in California, and 0.2 per cent in New York.

Septoria lactucae Pass., leafspot. New Jersey.

Brown rot (undet.), caused a loss of 6 per cent in California, according to Milbrath.

Chlorosis due to excess of lime, Texas.

Mosaic (virus). New York, New Jersey, Florida. New York - Loss 2 per cent. Variety New York more resistant than Big Boston. (Barrus). New Jersey- Reported from both north and south Jersey. Some growers are of the opinion that the trouble is only a "sport" of lettuce. Big Boston and Cos (Romaine) susceptible. (Chupp).

Tip-burn (non-par.). Connecticut, New York, Pennsylvania, Missouri, Colorado, Oregon, California. Followed by Botrytis or bacteria in a number of cases. New York - Loss 10 per cent. (Barrus). Pennsylvania, vicinity of Philadelphia - This trouble was especially severe after the heavy rainfall near the middle of June; associated with Botrytis. (Beach). Missouri - This is the limiting factor in the culture of head lettuce. (Archer). Oregon - Lettuce tip burn and slime developed seriously following the advent of very hot weather in early June. (Barss). California - Iceberg and Grand Rapids resistant; New York susceptible. (Rawlins). Milbrath estimated a 1 per cent loss for California.

Yellows (white heart, rabbit ear, Rio Grande disease). New York - Loss 5 per cent. The disease is abundant on milkweed all over the state. Not transmitted through the seed. Iceberg very susceptible. (Barrus). Pennsylvania - Caused a loss of about 50 per cent in the Philadelphia section. This disease has been observed in this locality in previous years. (Beach). Tennessee - In Knox County 15 per cent infection of variety New York was observed. The six-spotted leafhopper was abundant in the fields. (E. L. Felix). Texas - In the vicinity of Laredo and the lower Rio Grande Valley, loss 1 per cent. (Taubenhaus). Kunkel (3) has shown that this disease is caused by the virus of aster yellows.

Recent literature:

1. Beach, W. S. Diseases of certain truck crops caused by Sclerotinia and Botrytis. In Pennsylvania Agr. Exp. Sta. Bul. 204 (Ann. Rept. 39: 1925-26): 16. 1926.

2. Felix, E. L. Correction of unproductive muck by the addition of copper. (Abstract). Phytopath. 17: 49-50. Jan. 1927.

3. Kunkel, L. O. Studies on aster yellows. Amer. Jour. Bot. 13: 646-705. Dec. 1926.

4. LeClerg, E. L. Leaf temperature in relation to tip burn of lettuce. (Abstract). Phytopath. 17: 44-45. Jan. 1927.

5. McGinty, R. A., and R. C. Thompson. Preliminary notes on tip-burn of lettuce. Proc. Amer. Soc. Hort. Sci. 22: 341-346. 1926.

Lettuce -Diseases
Peas - Root rots; blight

6. Melchers, L. E. Botrytis blossom blight and leafspot of geranium and its relation to the grey mold of head lettuce. Jour. Agr. Res. 32: 883-894. 1926.

7. Thompson, R. C. Tipburn of lettuce. Colorado Agr. Exp. Sta. Bul. 311: 1-31. May 1926.

DISEASES OF PEAS

ROOT ROTS AND WILTS CAUSED BY VARIOUS ORGANISMS

Aphanomyces euteiches Drechs. was reported from New York, New Jersey, Maryland, Michigan, and Wisconsin. New York - In general of minor importance except in low or poorly drained soil. (Leon K. Jones). New Jersey - Less than usual; cold in early part of pea season. Decreased acreage in most severely infected areas and planting of varieties, slightly resistant to disease has reduced losses. World's Record and Sutton's Ideal susceptible, most varieties planted in the state very susceptible. (Haenseler). Maryland - 10 per cent loss. (Temple & Jehle).

Fusarium sp. caused root rot or wilt in Connecticut, Maryland, Indiana, Wisconsin, and Colorado. In Indiana, according to Kendrick, the organism was the same as that reported by Linford as a cause of wilt in Wisconsin. The loss was 5 per cent in Indiana, and 1 per cent in Maryland.

Fusarium martii pisi F. R. Jones, New York.

Corticium vagum Berk. & Curt. New Jersey, Georgia, Louisiana, Minnesota, Washington.

Sclerotinia sclerotiorum (Lib.) Mass. Serious in one field at Mt. Vernon, Washington. (Div. Plant Path.)

Undetermined. South Carolina - Has become the limiting factor in growing peas in this state. Loss 30 per cent. (Moore). Also reported from Massachusetts and Arkansas.

Recent literature:

1. Jones, F. R. Resistance of peas to root-rot. Phytopath. 16: 459-476. July 1926.

2. Togashi, K. On three species of Fusarium which cause the wilt-disease of pea. Jour. Soc. Agr. & For. Sapporo, Japan 18: (149) -(154). July 1926. (In Japanese)

BLIGHT CAUSED BY ASCOCHYTA SPP.

Ascochyta blight was reported in 1926 from New York, New Jersey, Maryland, Florida, Indiana, Wisconsin, and California. Apparently the disease was mostly unimportant. Some of the comments of collaborators follow:

Peas - Blight; Other diseases

New York: The relatively dry season was unfavorable for its development and in general it did not appear as damaging on upper parts of plants until August 1, at which time practically all the canning peas were harvested. (Leon K. Jones).

Florida: One field of peas, about 3 acres, was practically ruined by pod blight. Pod lesions were so numerous as to render the pods unsalable. Leaf infection was less conspicuous. There is evidence that the organism was prevalent in the soil, as the seed were of the same lot as those planted in another field which showed no pod spot. (W. B. Tisdale).

New Jersey: On fertile soil good yieldsmay be obtained with 100 per cent infected plants. Reduction in yield due to disease difficult to estimate. (Haenseler).

Leon K. Jones (2) reports that Mycosphaerella pinodes (Berk. & Blox.) Stone is the ascigerous stage, not of Ascochyta pisi Lib., but of another closely associated species of Ascochyta which causes a distinct disease of the pea plant. The ascigerous stage of A. pisi has not been found. Both species are carried in the seed.

Recent literature:

1. Gilchrist, G. G. The nature of resistance to foot rot caused by Ascochyta sp. and some other fungi in the epicotyl of the pea. Phytopath. 16: 269-276. April 1926.

2. Jones, Leon K. The relation of Mycosphaerella pinodes to Ascochyta blight of peas. (Abstract). Phytopath. 17: 44. Jan. 1927.

OTHER DISEASES

Bacterium pisi (Sack.) EFS., bacterial blight, was reported from New York, South Carolina, Georgia, Florida, Mississippi, Indiana, and Wisconsin. New York - Prevalent over pea growing area of state, causing about 5 per cent loss to crop. More damage to Alaska and Surprise than to later varieties. (Leon K. Jones). South Carolina - Loss 15 per cent. (Moore).

Caconema radicicola (Greef) Cobb, root knot. What is, so far as known, the first case of nematode attack on a field crop in Wisconsin was reported in 1926. A field of Admiral peas on light sandy soil in Sauk County was severely injured. Specimens were sent by Linford and Vaughan to Doctor Cobb, of the Bureau of Plant Industry, who stated that "Under sufficiently favorable conditions this pest occurs as far north as your latitude, but is infrequent." Polygonum convolvulus and Chenopodium album growing in the pea field were also affected.

Root knot was also reported from Texas, where Taubenhaus estimated a loss of 1 per cent.

Peas - Other diseases
Cotton - Wilt

Erysiphe polygoni DC., Powdery mildew, was reported from New York, Florida, New Mexico, Washington, and Oregon, and from Sonora, Mexico. Washington - Very prevalent in the Puyallup Valley. Some plantings so heavily infected as to ruin the later pickings. (Div. Plant Path.). Mexico - Six thousand acres of green peas are grown in the Yaqui Valley, State of Sonora, for shipment to the United States during the winter. In that Valley the damage from mildew was complete in fields where sulfur was not used. Very good results were obtained, however, where sulfur was applied. This was done to a considerable extent by use of the airplane, one application of 15 pounds per acre being effective. Where dusting was done by hand from 30 to 40 pounds per acre was used. The airplane method of applying dust seemed very satisfactory. (A. W. Morrill).

Fusicladium pisicola Linford, black leaf, is described from Utah and Idaho. (1)

Peronospora viciae (Bork.) D By., downy mildew. Florida, Wisconsin.

Septoria pisi West., leafspot. Florida, Wisconsin.

Chlorosis due to excess of lime. Texas.

Mosaic (virus). New Jersey, Washington.

Recent literature:

1. Linford, M. B. Black-leaf of peas caused by Fusicladium pisicola n. sp. Phytopath. 16: 549-558. Aug. 1926.

2. Ludwig, C. A. Pseudomonas (Phytomonas) pisi Sackett, the cause of a pod spot of garden peas. Phytopath. 16: 177-183. March 1926.

COTTON

WILT CAUSED BY FUSARIUM VASINFECTUM ATK.

Wilt was reported from practically all of the cotton states as far west as Texas, in the majority as of about the usual prevalence. Losses were estimated as follows: 5 per cent, South Carolina; 3 per cent, Georgia, Mississippi, and Arkansas; 2.2 per cent, North Carolina; 1 per cent, Louisiana and Texas. As high as 50 per cent infection was noted in some Mississippi and Arkansas fields. The fungus is said to be gradually spreading to new areas in South Carolina.

In North Carolina, G. W. Fant reported that Dixie Triumph and the newly developed Super Seven wilt-resistant varieties were being used with good results. In South Carolina these two varieties and also Humco-Dixie 14 are reported to have produced well on wilt infested soil and as a result the demand for seed is increasing. Varieties said to be very resistant are Watson Long Staple and Lightning Express in Mississippi, and Cook, Super Seven, and Dixafifi in Arkansas.

Cotton - Wilt; Angular Leaf spot; Anthracnose

Recent literature:

1. Butler, E. J. The wilt diseases of cotton and sesamum in India. Agr. Jour. India 21: 268-273. July 1926.

ANTHRACNOSE CAUSED BY GLOMERELLA GOSSYPII (SOUTHWORTH) EDG.

Anthracnose was reported from the eastern cotton states in about the same amounts as usual, although in Virginia more, and in North Carolina and Arkansas less, than the average amounts were recorded. Attack on the seedlings by this fungus, causing a damping-off, was reported in some states. Percentage losses were estimated as follows: 5, Tennessee; 3, Alabama; 2, Virginia, Mississippi; 1.6, North Carolina; 1, Louisiana; 0.5, Texas. Neal and Wedgworth of Mississippi stated that the varieties Miller, Acala, Delfos, and Trice showed evidences of being slightly resistant.

G. M. Armstrong, located at Florence, South Carolina remarked that a few years ago anthracnose was thought to have caused considerably greater losses than at present.

ANGULAR LEAF SPOT CAUSED BY BACTERIUM MALVACEARUM EFS.

This disease was more widespread than either anthracnose or wilt, occurring in some of the western cotton states, such as Arizona, as well as in the eastern. It was about as prevalent as last year, although South Carolina reported more and Florida and Arizona less. Armstrong reported it as the most important cotton disease of the year at the Pee Dee Experiment Station in South Carolina, where it caused partial defoliation in some plantings, and the loss was as much as 5 per cent in the most severely affected fields. Considerable defoliation occurred in Mississippi, according to Neal. In Texas, Taubenhaus reported the disease as occurring in epidemic form throughout the state. In Arkansas wet weather early in the season was favorable for it.

Percentage reductions in yield were reported as follows by collaborators: 5, Texas; 2, Georgia; 1.5, North Carolina, Alabama, and Arkansas; 1, South Carolina, Mississippi, Louisiana, Tennessee, and Arizona.

No differences in varietal susceptibility were mentioned except that in Arizona, Streets reported Pima and Acala as susceptible.

In Arizona it was stated that the delinting of 47,000 pounds of seed with sulfuric acid by the Experiment Station gave perfect control. Archibald (1 and 2) has reported that the sulfuric acid seed treatment does not completely disinfect the seed but although not entirely satisfactory, nevertheless is beneficial.

Recent literature:

1. Archibald, R. G. Black arm disease of cotton with special reference to the existence of the causal organism B. malvacearum within the seed. Soil Science 23: 5-9. Jan. 1927.

2. ---------- Sulfuric acid treatment of cotton seed. Soil Science 23: 1-3. Jan. 1927.

ROOT KNOT CAUSED BY CACONEMA RADICICOLA (GREEF) COBB

Root knot probably occurred in all cotton states, causing damage both in itself and in association with wilt on sandy soils. Losses of 2 per cent in Georgia and Arkansas; 1.5 per cent in North Carolina; and 0.5 per cent in Texas were reported.

BLIGHT CAUSED BY ASCOCHYTA GOSSYPII SYD.

This disease, which is known to occur in Virginia, North and South Carolina, Alabama, Mississippi, and Arkansas, was reported in 1926 from three of these states, Virginia, South Carolina, and Alabama. In Virginia specimens were received from a single locality, and in South Carolina only one complaint was brought to the attention of the Experiment Station. In Alabama it was found for the first time in Elmore County and W. L. Blain who made the report remarked that this is the third year that it has been found in the state and each year it has been found further northward. All infections thus far found in Alabama have been localized and did not seem to be doing much damage.

ROOT ROT CAUSED BY OZONIUM OMNIVORUM SHEAR

This disease, which is known to occur in Texas, Oklahoma, New Mexico, Arizona, California, and probably Arkansas, was reported to the Survey in 1926 from Texas and Arizona only although it doubtless occurred in the other states. In these two states it is said to be the most important cotton disease. Favored by wet weather, it occurred in an unusually destructive form in Texas this year. According to Taubenhaus it seemed to be more severe than ever before, and numerous reports from the Bureau of Agricultural Economics and trade papers also indicated serious damage. Taubenhaus estimated a loss of 20 per cent of the crop in Texas from this disease, and R. B. Streets estimated 7.5 per cent reduction in yield in Arizona, where it occurred generally in the southern part of the state.

Recent literature:

1. King, C. J., and A. R. Leding. Experiments in cotton root rot control. U. S. Dept. Agr. Circ. 372: 9, 10. 1926.

2. _____ and H. F. Loomis. Experiments on the control of cotton root rot in Arizona. Jour. Agr. Res. 32: 297-310. 1926.

3. McNamara, H. C. Behavior of cotton root rot at Greenville, Texas, including an experiment with clean fallows. Jour. Agr. Res. 32: 17-24. 1926.

4. Peltier, G. L., C. J. King, and R. W. Samson. Ozonium root rot. U. S. Dept. Agr. Bul. 1417: 1-25. Aug. 1926.

STEM ROT, SORESHIN, DAMPING-OFF CAUSED BY CORTICIUM VAGUM BERK. & CURT.

In South Carolina, Mississippi, Louisiana, Arkansas, Texas, and Arizona, considerable trouble from this disease resulted. In Louisiana, Arkansas, and Arizona particularly, collaborators remarked that wet and cool weather in the early part of the season caused much rotting of young plants, necessitating a great deal of replanting.

MALNUTRITION "RUST" (NON-PAR.)

In North Carolina, collaborators reported more "rust" than usual, and members of the Office of Soil Fertility, Bureau of Plant Industry, who have had experiments located in that state, reported:

> "Rust was quite prevalent in the state. In an experiment near Wilson it was said to be especially bad. It appeared first about August 15. Plots where 900 pounds of a fertilizer containing 6 per cent potash was used did not show rust." (J. J. Skinner)

In Mississippi and Arkansas it was also said to be rather important. In Texas, 0.1 per cent loss from this cause was estimated.

Recent literature

1. Neal, D. C. Cotton rust. What it is and how to control it. Quart. Bul. Mississippi State Plant Board 6 (2): 5-7. July 1926.

OTHER DISEASES

Alternaria sp., leaf spot. Mississippi - not as serious as during the very dry year of 1924-25; and Porto Rico.

Cercospora sp., leaf spot. North Carolina - prevalent on plots showing "rust" symptoms. Extent of damage questionable. (Fant).

Diplodia gossypina Cke., boll rot. Traces reported in Texas. According to Stevens (8) the perfect stage of this fungus is Physalospora rhodina (Berk. & Curt.) Cke.

Dwarfing. South Carolina - a dwarf condition of cotton was very common in parts of the state this spring and caused considerable anxiety and loss to growers. The cause is not known. There seemed to be no fungus concerned and no environmental conditions were present which one would expect to have serious deleterious effects. Flea hoppers were abundant, and these may be at least partly responsible, but the injury was not of the type usually caused by the attack of this insect. (Ludwig)

Helminthosporium gossypii Tucker, boll spot. This fungus has recently been described by Tucker (9) causing spots on leaves, flower bracts, and bolls in the principal cotton growing sections of Porto Rico.

Kuhnaola gossypii (Lagh.) Arth., rust, Porto Rico - occasional but not severe. (Cook).

Macrosporium nigricantium Atk., black leaf spot. South Carolina, Mississippi, Missouri. Damage slight in all cases.

Mosaic (undet.) H. D. Barker (1) reports mosaic of cotton as a very important disease in Haiti. It seems to be worse on certain introduced varieties. Native cottons are not so badly affected. The differences in susceptibility of varieties seem to be marked.

Mycosphaerella gossypina (Cke.) Earle, leaf spot. Porto Rico - the most common disease of cotton on the Island. Texas - trace.

Phoma sp. Traces of a disease which was at first mistaken for Ascochyta blight but later identified as being associated with a Phoma were found in Mississippi. It is possible that it was secondary to lightning injury.

Rhizopus sp., boll rot, was observed in southwestern California by Shapovalov both in 1925 and in 1926. It was found in both the Imperial and San Joaquin Valleys but appeared to be much more active in the latter. Rhizopus rot is well known in Egypt, where, as in the present case, it is considered a wound decay.

Recent literature

1. Barker, H. D. Plant diseases and pests in Haiti. Intern. Rev. Sci. and Pract. Agr. n.s. 4: 184-187. 1926.

2. Hopkins, J. C. An introductory note on two bacteria causing an internal rot of cotton bolls. Ann. Appl. Biol. 13: 260-265. May 1926.

3. Jones, G. H., and T. G. Mason. On two obscure diseases of cotton. Ann. Bot. 40: 759-772. Oct. 1926.

4. Laycock, T. Preliminary investigations of the parasitism of certain fungi causing boll rots of cotton. Ann. Bul. Agr. Dept. Nigeria 4: 32-49. 1925.

5. Marsh, R. W. Inoculation experiments with Nematospora gossypii Ashby and Nowell. Ann. Bot. 40: 883-889. Oct. 1926.

6. Moore, E. S. Cotton diseases in South Africa. African Sugar and Cotton Plant. 2 (10): 27-29. Oct. 1926.

7. Shapovalov, M. Aspergillus decay of cotton bolls. (Abstract) Phytopath. 16: 75. 1926.

8. Stevens, Neil E. Two species of Physalospora on Citrus and other hosts. Mycologia 18: 206-217. 1926.

9. Tucker, C. M. A leaf, bract, and boll spot of Sea-Island cotton caused by Helminthosporium gossypii n. sp. Jour. Agr. Res. 32: 391-395. 1926.

D I S E A S E S O F T O B A C C O

WILDFIRE CAUSED BY BACTERIUM TABACUM WOLF & FOSTER

Wildfire was reported in 1926 from five states, namely, Connecticut, Maryland, Kentucky, Florida, and Wisconsin. In Connecticut it was thought to be about as prevalent as usual, or possibly more so, according to Clinton and Anderson. Jehle and Hunter reported that it was widely distributed in Maryland and caused perhaps 1 per cent reduction in yield and 3 per cent loss in grade. Some fields showed as high as 80 per cent infection. In Maryland as in other Eastern States, dry weather inhibited development in the early part of the season, but rains favored infection later. In Kentucky, Valleau reported infection in several plant beds near Harrodsburg, where it has been common each season since 1920. W. B. Tisdale stated that wildfire occurred in only one seed bed this year in the vicinity of Quincy, Florida, an experimental bed that had had wildfire in it last year. In Wisconsin there was comparatively little spread in the field and the disease caused practically no damage, due to the absence of storms and to relatively dry weather, according to James Johnson.

E. S. Moore (1) states that wildfire, on account of the rapidity of its spread and the heavy losses it may cause, is one of the most dreaded diseases of tobacco in South Africa.

Recent literature

1. Moore, E. S. Diseases of Virginian tobacco in South Africa. Jour. Dept. Agr. South Africa 12: 428-455. Sept. 1926.

ANGULAR LEAFSPOT CAUSED BY BACTERIUM ANGULATUM FROMME & MURRAY

Connecticut, Virginia, Florida, Kentucky, and Indiana reported angular leafspot in 1926. In Connecticut, seven reports were received. In Virginia where a loss of 2 per cent was estimated, the disease appeared late, following rains in August and caused severe damage to the Burley crop in Russell County. In Washington County the loss was much less and in Charlotte County the disease

occurred only locally. In Florida, W. B. Tisdale reported finding angular leafspot in one plant bed where it also occurred in 1925. In Indiana, it was first noted August 13. In Wisconsin, James Johnson observed that the disease was conspicuous by its absence. From Kentucky, W. D. Valleau reported as follows, September 15:

> "This disease was very prevalent in plant beds and, in the Burley section, is now very prevalent in nearly every field, in some cases ruining the crop and on an average causing probably between 5 to 10 per cent injury.
>
> The use of two-year old seed with other sanitary precautions has in some cases given striking results in control both in plant beds and in the field."

BLACK ROOT ROT CAUSED BY THIELAVIA BASICOLA (BERK. & BR.) ZOPF.

McCormick (2) at the Connecticut Experiment Station has concluded that the cause of black root rot is Thielaviopsis basicola (Berk.) Ferraris rather than Thielavia basicola, and that there seems to be no real justification for considering the latter as the perfect stage of the former.

In 1926 black root rot was reported from Connecticut, Virginia, Kentucky, Tennessee and Wisconsin, although it does occur in other tobacco growing states. In Connecticut about the average amount was observed, according to Clinton and Anderson. In Virginia it was noted as severe in one field in Charlotte County and in Kentucky infection was about the same as usual, being most common in the Burley section on limestone soil. In Wisconsin the disease was said to be generally present in old tobacco fields but the damage was apparently below normal.

The use of resistant strains is decreasing the loss considerably in Wisconsin. A resistant selection of Burley is now being widely grown in Kentucky.

Anderson, Osmun, and Doran (1) have reported on the effects of lime on the growth of tobacco and the presence of root rot. On acid soil the immediate effect of liming was to increase the yield of tobacco, but as more lime was added black root rot was favored, with a consequent reduction in yield. It seems to be most injurious in nearly neutral soils.

Recent literature

1. Anderson, P. J., A. V. Osmun, and W. L. Doran. Soil reaction and black root rot of tobacco. Massachusetts Agr. Exp. Sta. Bul. 239: 117-136. Apr. 1926.

2. McCormick, Florence A. Perithecia of Thielavia basicola Zopf in culture and the stimulation of their production by extracts of other fungi. Conn. Agr. Exp. Sta. Bul. 269: 539-554. Aug. 1925.

MOSAIC (UNDET.)

Mosaic was widespread in tobacco sections as usual. Some of the individual state reports are as follows:

Connecticut: Twenty reports; little severe injury. Mostly seen on Broadleaf and Havana. (Clinton & Anderson)

Maryland: General over the tobacco growing section of the state. It is about as prevalent this year as last, but the injury is somewhat greater. Several fields have been found in which 50 per cent of the plants were severely stunted. In numerous fields 100 per cent of the plants show infection. About 10 per cent of the plants were injured by early infection. Mosaic blister is more severe than usual this year. (Jehle & Hunter)

Virginia: Present in practically every field but especially on replants and suckers. (Fromme).

Kentucky: About the usual amount of infection but decidedly less mosaic-burning than last year, apparently because of wet weather. (Valleau).

North Carolina: Very prevalent in eastern Carolina this season. Few if any fields are entirely free from the disease. (Fant).

Georgia: Reduction in yield 0.5 per cent. Loss in grade 1 per cent. Curing tests showed: Healthy leaves, 66 per pound with average price of 32 cents. Mosaic leaves, 85 per pound with average price of 25 cents. (O. C. Boyd).

Wisconsin: Occurring commonly on occasional plants in most fields but not involving much loss except in relatively small number. (James Johnson).

Porto Rico: Common and sometimes abundant. (Cook).

Recent literature

1. Eyles, F. Tobacco mosaic in southern Rhodesia. Selection for resistance. Rhod. Agr. Jour. 23: 248-252. Mar. 1926.

2. Goldstein, Bessie. A Cytological study of the leaves and growing points of healthy and mosaic diseased tobacco plants. Bul. Torr. Bot. Club 53: 499-500. Nov. 1926.

3. Goldsworthy, M. C. Attempts to cultivate the tobacco mosaic virus. Phytopath. 16: 873-875. Nov. 1926.

4. Johnson, J. Mosaic diseases on differential hosts. Phytopath. 16: 141-149. 1926.

5. Jones, P. M. Structure and cultural history of a mycetozoan found in tobacco plants with mosaic-like symptoms. Bot. Gaz. 81: 446-459. June 1926.

6. Link, G. K. K., Philip M. Jones, and W. H. Taliaferro. Possible etiological role of Plasmodiophora tabaci in tobacco mosaic. Bot. Gaz. 82: 403-414. Dec. 1926.

7. McKinney, H. H. Virus mixtures that may not be detected in young tobacco plants. Phytopath. 16: 893. Nov. 1926.

8. Mulvania, M. Studies in the nature of the virus of tobacco mosaic. Phytopath. 16: 853-871. Nov. 1926.

9. _____ The destructive action of certain bacteria on the virus of tobacco mosaic. Jour. Bact. 11: 98. 1926.

10. Purdy, Helen A. Attempt to cultivate an organism from tomato mosaic. Bot. Gaz. 81: 210-217. 1926.

11. _____ Multiplication of the virus of tobacco mosaic in detached leaves. (Abstract). Phytopath. 17: 58. Jan. 1927.

12. Valleau, W. D., and E. M. Jones. Commercial tobaccos and cured leaf as sources of tobacco mosaic. (Abstract). Phytopath. 17: 49. Jan. 1927.

OTHER DISEASES

Bacillus carotovorus Jones, hollow stalk. Specimens of tobacco leaves which had dropped off from newly set tobacco plants were received by W. D. Valleau from southwestern Indiana. Regarding it he wrote, "The rot appeared to be bacterial and was killing the plants as well as rotting the base of the leaves. We assume it to be caused by Bacillus carotovorus as it occurred during wet weather and this organism causes a similar disease in topped tobacco."

Bacterium melleum Johnson, bacterial leaf spot. Reported from Kentucky and Tennessee. From the former state, W. D. Valleau reported, "This disease appeared in a small area in a plant bed on the Experiment Station farm after the canvas had been removed. No sign of it was seen before that time. The spots were similar to wildfire but the organism appeared yellow in culture. James Johnson considered it the same as his Bacterium melleum."

Bacterium solanacearum E.F.S., bacterial wilt. Very common and serious during the dry season in the Philippine Islands. (David & Roland (2).

Brown root rot, undet. This disease has recently been reported by Johnson, Slagg, and Murwin (3). Affected plants are characterised by brown discoloration

and decay of the roots. In its behavior with respect to soil sterilization and infection and in certain other respects the disease appears to be of parasitic origin, but no definite causal organism has been found. On the other hand, there are other indications pointing towards the non-parasitic nature of the disease.

In 1926, collaborators reported brown root rot from Connecticut, Kentucky, and Wisconsin. In Kentucky it was observed in several parts of the state but was a very minor factor in the early part of the season when it seems to be most injurious. In Wisconsin, James Johnson reported that it was no doubt the major cause of the poor fields in 1926. He estimated a reduction in yield of from 20 to 25 per cent.

Cacocnema radicicola (Greef) Cobb, root knot. South Carolina and Georgia reported trouble from root knot. In the latter state it was widely distributed but due to plentiful rains plants withstood the attack better. This disease is very common in parts of the Philippines, according to David and Roldan (2).

Cercospora nicotianae Ell. & Ev., frog-eye. Reported from Georgia by O. C. Boyd who estimated 1 per cent reduction in yield and 3 per cent loss in grade. In Porto Rico, Mel T. Cook reported it common on early leaves but apparently of very little or no importance.

Chlorosis (undet.) Porto Rico.

Curly dwarf (undet.) This disease has recently been described by Slagg (5). It was first observed in the summer of 1922 on a number of adjoining farms in Connecticut and has been present in this locality every year since. It has also been reported from Ontario and Wisconsin. At present it is considered a minor disease, although in one locality in Connecticut it has assumed some importance. The cause is not known. A similar trouble has been reported by Moore (4) from South Africa.

Frenching (undet.) Reported from Maryland and Kentucky. Valleau (8) has obtained results indicating that this is due to a disturbed nitrogen relationship and if a readily available supply of nitrogen is added frenched plants will recover.

Frost mottling. Late frost of June 16 caused an irregular white mottling of the leaves, often followed later by mis-shaping, in Connecticut, according to Clinton and Anderson.

Fusarium oxysporum nicotianae Johnson, Wilt. Traces of this disease were found in most sections of Maryland. As high as 10 per cent infection was observed in one field. Due to the extremely wet weather the plants did not show the typical wilting but the vascular system was distinctly discolored. According to Moore (4) this has occurred for a considerable number of years in South Africa.

Fusarium affine Fautr. & Lamb., leaf spot. Connecticut - 3 reports on old leaves usually in contact with soil, causing little injury. (Clinton & Anderson)

Macrosporium sp., brown spot. This disease, probably caused by M. longipes Ell. & Ev., was reported from South Georgia, by Boyd, who stated that it was considerably less noticeable than in 1925. Many fields, however, showed both leaf and stalk lesions before the first cropping. Many stalk lesions ranged from one centimeter in diameter to cankers completely girdling the stalk.

Marbling (non-par.) One report from Connecticut.

Phytophthora sp., sometimes severe in the seed-bed and common as a field disease in Porto Rico, according to Cook.

Tobacco - Other Diseases
Sugar Cane - Mosaic (Undet.)

Phytophthora nicotianae (Speg.) Van Breda de H., black shank. From Florida, W. B. Tisdale reported that black shank began to appear in the experimental plots and a few commercial fields about April 15. Tisdale and Kelley (7) have recently reported on this disease.

Pythium sp., root rot. A Pythium with spiny oospores was found attacking tobacco September 21 at Windsor, Connecticut, according to F. A. McCormick.

Pythium debaryanum Hesse, damping-off. Connecticut, Porto Rico, Philippine Islands.

Ring spot (undet.) Reported from Connecticut, Maryland, and Virginia. Only slightly important in all cases.

Sclerotinia sclerotiorum (Lib.) Mass., stem rot or soreshin. Connecticut.

Thick leaf (non-par.) Reported by Jehle from Maryland where it was confined to seed beds in which commercial fertilizer containing potassium chlorate was used. Leaves are thick, rolled upward, brittle, and plants stunted.

Recent literature

1. Clara, F. M. Diseases of tobacco (Nicotiana tabacum L.) in the Philippines. Philipp. Agr. Rev. 18: 564-570. 1925.

2. David and Roldan. Philipp. Agriculturist 15: 287-301. 1926.

3. Johnson, J., C. M. Slagg, and H. F. Murwin. The brown root rot of tobacco and other plants. U. S. Dept. Agr. Bul. 1410: 1-29. July 1926.

4. Moore, E. S. Diseases of Virginian tobacco in South Africa. Jour. Dept. Agr. So. Africa 12: 428-441. Sept. 1926.

5. Slagg, C. M. New and unusual diseases and injuries of tobacco. Scient. Agr. 6: 193-198. Feb. 1926.

6. Tisdale, W. B., and J. G. Kelley. Stem injury of tobacco caused by fungi growing on the poison mixture used for controlling budworms. Florida Agr. Exp. Sta. Bul. 182: 279-286. May 1926.

7. _____ A Phytophthora disease of tobacco. Florida Agr. Exp. Sta. Tech. Bul. 179: 159-219. May 1926.

8. Valleau, W. D., and E. M. Johnson. The relation of nitrates to tobacco frenching. Science n.s. 64: 278-279. Sept. 17, 1926.

DISEASES OF SUGAR CANE

MOSAIC (UNDET.)

This important cane disease was reported by collaborators from Florida,

Alabama, Mississippi, Louisiana, and Porto Rico, and also by others from Cuba and Haiti. In Florida, it was of minor importance, as usual, according to Weber. Miles stated that it is general in most plantings in southern Alabama but the loss not appreciated since cane is grown there only for syrup. In Mississippi, Wedgworth reported as follows, August 15:

> "A recent partial survey of the southern and central counties of the state shows mosaic present in all cane fields of the Purple variety. Plantings of Cayana 10 were free of mosaic in all fields visited. The Purple variety showed an average infection of about 65 per cent, ranging from 5 per cent in a few small plantings to 100 per cent in many plantings."

In Louisiana, Tims reported that the disease continued to be moderately important, occurring generally and perhaps causing 10 per cent loss in sugar. Promising results in the selection of resistant strains from susceptible varieties were mentioned. In Porto Rico, Mel. T. Cook reported it as under control in many localities but spreading as a result of neglect in others. In Cuba W. A. Orton reported:

> "The common sugar cane mosaic is widely distributed throughout Cuba but is less prevalent in the western part of the Island than in the eastern. It is most serious on plantations where diseased cane was planted during the period of rapid expansion in 1918-1919."

In Haiti, H. D. Barker reported as follows:

> "One of the most serious diseases in Haiti at present is the mosaic of sugar cane. It is generally distributed and very destructive throughout the Island. Uba, an immune variety, is being grown to a considerable extent by the Haitian-American Sugar Company. The indications are that this or other resistant varieties will greatly relieve the situation. Improved cultural conditions may also greatly aid in keeping the disease under control."

Recent literature

1. Bonazzi, A. Study on sugar cane mosaic. Science n.s. 64: 529-530. Nov. 26, 1926.

2. Bremer, G. Een cytologisch van strepenziekte bij suikerriet en andere planten. Arch. Suikerind. Ind. (Meded.) 1926 (11): 337-371. 1926.

3. Cook, Mel. T. Some effects of mosaic on the content of the cell. (Abstract) Phytopath. 17: 57. Jan. 1927.

4. East, E. M., and W. H. Weston. A report on the sugar cane mosaic situation in February 1924 at Soledad, Cuba. Contrib. Harvard. Inst. Trop. Biol. & Med. 1: 1-52. 1925.

5. Hansford, C. G. The mosaic disease of sugar cane. Microbiol. Circ. Dept. Agr. Jamaica. 6: 1-15. 1926.

6. McRae, W. Mosaic disease of sugar cane in India in 1925. Agr. Jour. India. 21: 198-202. May 1926.

7. Storey, H. H. The cane disease situation. Proc. Ann. Congr. South Afr. Sugar Assoc. 4: 69-73. 1926.

8. Walker, W. N., and C. F. Stahl. Certain grass hosts of the sugar cane mosaic disease and of the corn aphid considered in relation to their occurrence in Cuba. Bul. Trop. Plant Res. Found. 5: 1-14. 1926.

9. Yoder, P. A. Rare cases of mosaic disease in highly resistant varieties of sugar cane. U. S. Dept. Agr. Circ. 392: 1-8. 1926.

ROOT ROT CAUSED BY RHIZOCTONIA, MARASMIUS, AND OTHER ORGANISMS

In Louisiana this continues to be one of the very serious disease problems with sugar cane in the state. According to E. C. Tims a loss of 25 per cent was estimated.

Recent literature

1. Agee, H. P. The root disease complex of sugar cane. Intern. Sugar Jour. 28: 648-650. Dec. 1926.

2. Altson, R. A. Root disease of sugar cane. Plant. & Sugar Manuf. 77: 230-231. Sept. 18, 1926.

3. Earle, F. S. Root disease of cane. Conditions which encourage attack and aggravate its effect. Facts About Sugar 21: 1117. Nov. 20, 1926.

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5. McGeorge, W. T. A review of soil investigations pertaining to growth failure of sugar cane. Hawaiian Plant. Rec. 30: 259-266. Apr. 1926.

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OTHER DISEASES

Bacterium vascularum Cobb, gumming disease. Porto Rico - severe in two locations and slight infections in others. Much less severe than in 1925. (Cook)

Caconema radicicola (Greef) Cobb, and other nematodes. In Hawaii, Muir and Henderson (21, 22) find three species of nematodes in sugar cane roots, namely, Caconema radicicola, Heterodera schachtii, and Tylenchus similis. They have been demonstrated to be the cause of growth failure in many cases.

Cercospora vaginae Krueger, red spot. Common but apparently of very little importance in Porto Rico, according to Mel. T. Cook.

Colletotrichum falcatum Went., red rot. Louisiana - unusually heavy again. Severe in planted cane. More than last year and more than usual. (Tims). Porto Rico - common but not important. (Cook).

Helmimthosporium sacchari Butl., eye leaf spot. Porto Rico - Abundant and severe on some varieties especially FC 306, D 109, and H 109. (Cook). This disease has been studied and reported on recently in Hawaii by Lee and his associates. (See reference list)

Leptosphaeria sacchari van Breda de Haan, ring spot. Porto Rico - common and abundant. Does not appear to be of much importance.

Plasmodiophora vascularum EFS. dry top rot, Porto Rico - Scattered throughout the greater part of the island, no serious outbreaks recently. (Cook)

Phyllosticta sp., leaf spot. Porto Rico - common but does not appear to be of much importance.

Pokkah bong (undet.) Louisiana - this disease retarded the growth of cane a great deal late in the season. It is rather generally distributed and was more important this year than last. (Tims.)

Recent literature

1. Ashby, S. F. Gumming disease of sugar cane in the British West Indies. Trop. Agriculture 3: 50-51. 1926.

2. Barber, C. A. Rye spot disease on the sugar cane in Hawaii. Intern. Sugar Jour. 28: 585-589. Nov. 1926.

3. Barnum, C. C. Studies on the pathological nature of the Uba node gall disease. Hawaiian Plant. Rec. 30: 510-511. Oct. 1926.

4. Brandes, E. W. History of Kavangire sugar cane in Porto Rico. An account of the introduction and spread of Kavangire, a disease resisting variety. Sugar Bul. 4(14): 1-5. Apr. 1926.

5. Cottrell-Dormer, W. Notes and observations on the red streak associated with Queensland top rot disease. Queensl. Agr. Jour. 25: 406-414. May 1926.

6. Faris, J. A. Cold chlorosis of sugar cane. Phytopath. 16: 885-891. Nov. 1926.

Sugar Cane - Other Diseases

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9. Lee, H. A. Evidence of a factor associated with actively functioning tissues which gives to sugar-cane plants resistance to the invasion of fungi and other micro-organisms. Jour. Gen. Physiol. 9: 381-386. 1926.

10. _____ Report of the Committee on the relation of cane disease to cane varieties. Hawaiian Plant. Rec. 30: 38-48. Jan. 1926.

11. _____ The history and distribution of eye spot. Hawaiian Plant. Rec. 30: 466-470. Oct. 1926.

12. _____ Losses caused by eye spot. Hawaiian Plant. Rec. 30: 472-474. Oct. 1926.

13. _____, C. C. Barnum, and W. C. Jennings. Combating red stripe disease. Sugar 28: 474-476. Oct. 1926.

14. _____, and J. P. Martin. Description of eye spot as compared with other sugar cane leaf spot diseases. Hawaiian Plant. Rec. 30: 470-471. Oct. 1926.

15. _____, and J. P. Martin. Progress report of experiments with fungicidal dusts against eye spot. Hawaiian Plant. Rec. 30: 482-484. Oct. 1926.

16. _____, J. P. Martin, and C. C. Barnum. A method of testing cane varieties for eye spot susceptibility and resistance. Hawaiian Plant. Rec. 30: 487-492. Oct. 1926.

17. Lyon, H. L. Galls on sugar cane in Hawaii. Hawaiian Plant. Rec. 30: 493-506. Oct. 1926.

18. Martin, J. P., and H. A. Lee. The effect of drying on the spores of the eye spot fungus. Hawaiian Plant. Rec. 30: 475-476. Oct. 1926.

19. _____, and H. K. Stender. The control of eye spot through resistant varieties. Hawaiian Plant. Rec. 30: 484-487. Oct. 1926.

20. McGeorge, Wm. T. Pahala blight and a comparison with other forms of sugar cane chlorosis. Hawaiian Planters' Rec. 30: 293-328. Apr. 1926.

21. _____. Nematodes considered in relation to root rot of sugar cane in Hawaii. Plant. & Sugar Manuf. 77: 370-371. Nov. 6, 1926.

22. Muir, F., and G. Henderson. Nematodes in connection with sugar cane root rot in the Hawaiian Islands. Hawaiian Plant. Rec. 30. 233-250. Apr. 1926.

23. North, D. S. Gumming disease on the Clarence. Australian Sugar Jour. 17: 661-662. 1926.

24. Serrano, F. B., and S. L. Marques. The red rot disease of sugar cane and its control. Philipp. Agr. Rev. 19: 263-265. 1926.

25. Shepherd, E. F. S. Diseases of sugar cane in Mauritius. Mauritius Dept. Agric. Bul. 32: 1-18. 1926.

26. Stewart, G. R. The possible relation between nematode injury to cane roots and soil conditions. Plant. & Sugar Manuf. 77: 349-350. Oct. 30, 1926.

27. Storey, H. H. Streak disease of Uba cane. Microbiol. Circ. Dept. Agr. Jamaica 6: 38-39. 1926.

DISEASES OF SUGAR BEET

CURLY TOP (UNDETERMINED)

The year 1926 was one of the worst years in the history of sugar beet growing as far as curly top was concerned. The losses in Utah, Idaho, Oregon, and parts of California were extremely heavy. Eubanks Carsner writing on October 24 says with regard to the situation:

> "The northwestern inter-mountain areas have this year suffered a more destructive outbreak than that of 1924 which, so far as I can ascertain, has not been rivaled since 1905. I think without doubt this is the worst year on record for Utah. The estimated loss for that state in 1924 was 40 per cent. This year the estimated loss is 60 per cent."

Reports from state collaborators and others follow:

Utah: The beet crop in southern Utah was almost a complete failure, though some beets were shipped out of Elsinore, Delta, and a few other localities. The curly top disease was largely responsible, the beet leafhopper, Eutettix tenella Baker, being found breeding in great numbers all through this section of the state in the lowlands. (G. F. Knowlton in U. S. Dept. Agr. Insect Pest Survey Bul. 6: 317. Nov. 1, 1926).

Idaho: Total loss in most sections. Only one factory in operation in state this season. (Hungerford)

(Caldwell-Weiser Section): Eighty-eight per cent plantings abandoned. (R. W. Haegele)

(Twin Falls Factory District): Beds plowed up for the most part in latter part of May and early June. Approximately 90 per cent acreage abandoned. (Walter Carter)

(Burley and Paul Factory Districts): Approximately 80 per cent acreage plowed up or abandoned. Sub-irrigated fields suffered least. (Carter)

(Utah-Idaho Company territory from Pocatello north to Sugar City): Disease serious in south but lessened in severity further north. Disease patchy, not general. Other conditions, aphis, nematode, old beet fields made accurate estimates impossible. (Carter)

California: There was relatively little loss this year from curly top in the central part of the state, but in southern California the damage was greater than has been known for many years. (Carsner)

McKay and Dykstra (3) have shown that the western yellow blight of tomatoes and diseases of other garden vegetables are also caused by the curly top virus. Compare the distribution of curly top and of the western yellow blight as shown in figures 23 and 24 (page 259).

Recent literature

1. Carsner, E. Resistance in sugar beets to curly top. U. S. Dept. Agr. Circ. 388: 1-7. July 1926.

2. _____ Seasonal and regional variations in curly top of sugar beets. Science n. s. 63: 213-214. Feb. 1926.

3. McKay, M. B. and T. P. Dykstra. Sugar beet curly top virus, the cause of western yellow blight. (Abstract) Phytopath. 17: 39. Jan. 1927.

NEMATODE, HETERODERA SCHACHTII A. SCHMIDT.

The situation with regard to the sugar beet nematode is well summed up in a recent publication by Gerald Thorne (4). His description of the geographic

distribution of the pest is the best that we have on that subject. He reports it as occurring in Nebraska and Montana, which are new states as far as Plant Disease Survey records are concerned. In 1926 D. G. Milbrath reported a loss of 3 per cent for California.

Recent literature

1. Maxson, A. C. The sugar beet nematode. Through the Leaves 14: 125-130. Mar. 1926.

2. Peters, B. G. Heterodera schachtii (Schmidt) and soil acidity. Jour. Helminth. 4: 87-114. Aug. 1926.

3. Stewart, G., and A. H. Bateman. Field studies of sugar beet nematode. Utah Agr. Exp. Sta. Bul. 195: 3-32. 1926.

4. Thorne, Gerald. Control of sugar beet nematode by crop rotation. U. S. Dept. Agr. Farm. Bul. 1514: 1-21. Nov. 1926.

OTHER DISEASES

Bacterium beticolum EFS., Brown, & Town., tuberculosis. G. H. Coons reported this disease, commonly confused with crown gall, as being rather generally found in fields at Rocky Ford and Lamar, Colorado. The losses, however, were very slight.

Bacterium tumefaciens EFS. & Town., crown gall. A few cases of true crown gall were reported from Michigan by Coons. It was of no apparent economic importance, however.

Caconema radicicola (Greef) Cobb, root knot. California.

Cercospora beticola Sacc., leaf spot. Reported from Louisiana, Kansas, Michigan, and Colorado. In northern Colorado abundant rains in the early part of the season favored the disease with the result that it was much more prevalent than usual and was very important, probably causing a loss in sugar yield of about 10 per cent, according to Coons. In the southern portion of the state, however, where the weather was drier it was only of slight importance. One per cent loss was reported in Louisiana, from a trace to 2 per cent in Michigan, and a trace in Kansas.

Phoma betae (Oud.) Frank, root rot and leaf spot. As a leafspot it was reported from Louisiana and as a root rot from Washington. No other data received.

Corticium vagum Berk. & Curt., and other fungi, root rots. This disease occurred generally in the sugar beets planted in Louisiana, being of much greater importance than usual. It was estimated by Tims that probably 50 per cent of the sugar beets were affected with this disease either in the field or after harvest.

In Michigan less damage from fungi of the damping-off type occurred than is commonly the case, the stands being reported rather good everywhere according to Coons.

Sclerotium rolfsii Sacc., stem rot. This disease threatens whole fields in Louisiana with destruction when weather conditions were favorable, according to Tims.

Recent literature

1. Appel, O. Taschenatlas der Krankheiten der Zuckerrübe. Berlin, P. Parey, 1926. (Pareys Taschenatlanten nr. 3).

2. Böning, K. Die Mosaikkrankheit der Rübe. Zeitschr. Pflanzenkr. 37: 19-25. 1927.

3. Coons, G. H. Root rot in sugar beets in Louisiana not dangerous. Plant & Sugar Manuf. 76: 488-489. June 1926.

4. Molz, E. Die Mosaikkrankheit der Zuckerrüben, eine in Deutschland neue und gefahrliche Zuckerrübenkrankheit. Deut. Landw. Presse. 53: 501. Oct. 2, 1926.

DISEASES OF OTHER CROPS

ARTICHOKE, JERUSALEM

Erysiphe cichoracearum DC., powdery mildew. Connecticut, one report, on Station farm at Mt. Carmel. (Clinton).

ASPARAGUS

Cercospora spp., leaf and stem spot. A specimen received from Florida by the Office of Vegetable and Forage Diseases was determined by W. W. Gilbert as C. asparagi Sacc. It was reported as causing considerable damage. C. caulicola Wint. was reported from Florida by Weber.

Fusarium sp. A Fusarium wilt or rot was reported from New Jersey and North Carolina. Stem canker due to a Fusarium occurred in Washington. Red streak caused by Fusarium sp. was responsible for a loss of 3 per cent in California, according to Milbrath.

Puccinia asparagi DC., rust, was reported from Connecticut, Virginia, Texas, Michigan, Missouri, South Dakota, and California, and from Manitoba, Canada. The loss in California was estimated by Milbrath to be 0.5 per cent. J. F. Brenckle reported the disease as very prevalent in South Dakota and Bisby stated that it was rather worse than usual in Manitoba. Nelson reported that one field of Mary Washington in Michigan was quite heavily infected.

BEET

Actinomyces scabies (Thax.) Güss., scab. New York, New Jersey. An experiment with beets in New Jersey gave the following results: Check rows, 43 per cent

scab; rows with 300 pounds of sulfur per acre, 38.3 per cent scab; with 600 pounds, 30 per cent. The 600 pounds of sulfur did not seem to injure the beets. This one beet farm has been badly infested for several years. (Chupp).

Bacterium tumefaciens EFS. & Towns., crown gall. Two to 3 per cent infection found in one planting in Bergen County, New Jersey. (Dept. Plant Path.).

Caconema radicicola (Greef) Cobb, root knot. Texas, loss 0.5 per cent. (Taubenhaus).

Cercospora beticola Sacc., leafspot. Connecticut, New York, New Jersey, Florida, Louisiana, Texas, and Indiana. A loss of 1 per cent was reported in Texas.

Phoma betae(Oud.) Frank. The leafspot was reported from New York. In the Norfolk section of Virginia McWhorter stated that "Seedling beets in greenhouse again show much loss from damping-off due to Phoma betae and Rhizoctonia sp. In two large houses more than 80 per cent have died; the stand is hardly more than 15 per cent. Several greenhouses have been planted with organic mercury treated seed and almost perfect control has resulted." 'Dec. 1926-Jan. 1927).

Sclerotium rolfsii Sacc., southern blight. Florida, Texas.

Curly top (virus). A report in the Arizona News Letter (State Comm. Agr. & Hort.) for August 31 states that curly top had been reported as especially severe in the vegetable growing districts of Navajo County. The disease was very destructive in Washington and Oregon, according to the following reports:

> Washington: Curly top has apparently been responsible for widespread failure of garden beets in eastern Washington. Abundance of leaf hoppers and favorable season have probably been the major factors in the epidemic nature of the disease. Mangels seem also to be nearly as severely affected as garden beets. (Dept. Plant Path.).
>
> Oregon: Curly top was very destructive in most of the state this year. It has been the worst season in history for this disease. Replanted crops were often totally destroyed also. It probably occurred in all but the Coast counties. The loss was 75 per cent. (McKay)

CARROT

Bacillus carotovorus Jones, soft rot. New York, Indiana. Indiana - In many fields in the Indianapolis gardens at least 30 per cent of the carrots were rotted. (Gregory).

Caconema radicicola (Greef) Cobb, root knot. Washington.

Corticium vagum Berk. & Curt. New York.

Macrosporium carotae Ell. & Langl., leaf blight. New York, Maryland, Florida, Ohio.

Rhizoctonia crocorum (Pers.) DC., violet root rot. Specimen received from S. M. Zeller of Oregon.

Sclerotium rolfsii Sacc., southern blight. Texas.

Curly top (?). Carrots were affected by a disease suspected to be due to the sugar-beet curly top virus in Oregon. (McKay).

Recent literature

1. Lauritzen, J. I. The relation of black rot to the storage of carrots. Jour. Agr. Res. 33: 1025-1041. Dec. 1, 1926. Alternaria radicina.

2. White, R. P. Rhizoctonia crown rot of carrots. Phytopath. 16: 367-368. May 1926.

C A S T O R B E A N

Ozonium omnivorum Shear, Texas root rot. Texas, prevalent, 10 per cent loss. (Taubenhaus).

E G G P L A N T

Alternaria solani (Ell. & Mart.) Jones & Grout, leafspot, New York, Washington; nailhead spot, Florida.

Bacterium solanacearum EFS., bacterial wilt Florida, Porto Rico.

Botrytis sp., stem rot, was present to a very limited extent in the Norfolk section of Virginia this season. (McWhorter).

Phomopsis vexans (Sacc. & Syd.) Harter, leafspot and fruit rot, was reported from Massachusetts, New York, New Jersey, Maryland, Virginia, Florida, and Porto Rico. A loss of 4 per cent was thought to have occurred in Maryland. A. M. Boyce stated that it was found in every planting in Nassau County, New York (Long Island) and was fairly serious in most cases. C. M. Haenseler reported from New Jersey that "Clean picking every seven days on an experimental plot of 400 plants reduced the loss to less than 5 per cent. Unpicked plots adjacent gave 100 per cent rotten fruits. The varieties Long Purple and Florida High Bush were susceptible, and Black Beauty was very susceptible."

Phyllosticta hortorum Speg., leafspot, Florida.

Pythium aphanidermatum (Edson) Fitz. is reported by Drechsler (1) as the cause of a cottony leak of eggplant fruits, which has been found in the field in Tennessee (1923) and Florida (1925).

Sclerotinia sclerotiorum (Lib.) Mass., blight and fruit rot, was reported by Foster as much more prevalent than usual in the Sanford section of Florida, in December. He stated that "The weather was dry but heavy dews at night may account for its appearance." A specimen of stem rot caused by this organism was received from Foster, collected from a field in which 60 per cent of the plants were affected.

Sclerotium rolfsii Sacc., stem rot, Florida.

Verticillium albo-atrum Reinke & Berth., wilt. New Jersey, "Florida High Bush and New York Improved are susceptible, Black Beauty is very susceptible. Wild eggplant (Solanum floridanum) from Florida was found to be too susceptible to be of value in breeding for resistance." (Haenseler). Also reported from Maryland.

Mosaic (virus). Pennsylvania, 10 per cent loss (Beach). Florida.

Recent literature

1. Drechsler, C. The cottony leak of eggplant fruit caused by Pythium aphanidermatum. Phytopath. 16: 47-50. Jan. 1926.

2. Haenseler, C. M. Plant diseases of New Jersey XI. Eggplant diseases. New Jersey Agr. 8 (10): 6-7. Oct. 1926.

ENDIVE

Sclerotinia sclerotiorum (Lib.) Mass., drop. Virginia, in the Norfolk section; Florida.

GARLIC

Tylenchus dipsaci (Kühn) East., bulb nematode, caused a loss in California estimated by Milbrath at 2 per cent. C. E. Scott, of the California State Department of Agriculture, sent specimens of garlic affected by this nematode, and said,

> "The specimens were collected in San Benito County June 29, 1926. The disease was first found in 1925 in San Benito, Monterey, and Santa Cruz Counties. In 1925 the disease spread rapidly whenever it appeared in a field. This year, due to the dry season, there has been but little direct injury in any field in the three counties. In practically every case (in 1926) we have traced the origin of the disease to diseased seed or to planting on infested land. The situation is now being handled by certification of all seed garlic (cloves for planting)."

GINSENG

Alternaria panax Whetzel, blight. West Virginia.
Vermicularia dematium (Pers.) Fr., stem anthracnose. West Virginia.
Papery leafspot (Non-par.). Missouri.

MANGEL WURZEL

Cercospora beticola Sacc., leafspot. New Jersey, "Some fields showed severe infection. In one field the beets in adjoining rows showed only slight infection." (Chupp); Ohio.

Curly top (virus). Washington, more important than usual. (Div. Plant Path.).

MUSHROOM

Mycogone perniciosa Magn. Pennsylvania. "It appears that this disease of mushrooms is prevalent to some extent in the houses of nearly all growers of whom there are about 500 near and west of Philadelphia. Loss about 5 per cent." (Beach).

OKRA

Cacosema radicicola (Greef) Cobb, root knot. South Carolina, Texas.
Cercospora hibisci Tr. & Earle, leafspot. North Carolina.
Fusarium vasinfectum Atk., wilt. Texas.
Ozonium omnivorum Shear, Texas root rot. Texas, loss 5 per cent. (Taubenhaus).
Rhizoctonia sp., root rot. Texas.
Verticillium albo-atrum Reinke & Berth., wilt. New Jersey.

PARSLEY

Pythium sp., and Rhizoctonia sp., damping-off. New Jersey.

PARSNIP

Bacillus carotovorus Jones, soft rot. "Small amounts became evident during a rainy spell in August, in Nassau County, New York." (A. M. Boyce).
Cercospora apii pastinacea Earl., leafspot. Connecticut.
Ramularia pastinacae (Karst.) Lindr. & Vestr., leafspot. Nassau County, New York. "Several pathogenes may be responsible but it is believed that Ramularia is the primary cause of the major part of the injury. Foliage browned considerably during a rainy spell in August." (A. M. Boyce).

Recent literature:

1. Stirrup, H. H., and A. Roebuck. Parsnip canker. Jour. Min. Agr. Great Britain 33: 824-826. Dec. 1926. Primarily non-parasitic.

PEANUT

Botrytis sp., stem rot. Mississippi.

Cercospora personata (Berk. & Curt.) Ell. & Ev., leafspot, caused a loss of 5 per cent in southern Georgia, according to Boyd, and was reported from North Carolina.

Fusarium sp., wilt, or root rot, said to be general in Prince George County, Virginia. (Fromme).

Fusarium sp. and Phoma sp., tip blight and leaf spot, Scott County, Missouri. Fusarium sp. was isolated from tissue culture. (Archer).

Ozonium omnivorum Shear, Texas root rot. Texas, loss 10 per cent. (Taubenhaus).

Sclerotium rolfsii Sacc., southern blight, caused a loss of 2 per cent in southern Georgia (Boyd). It was reported from Texas also.

Chlorosis (non-par.), due to excess of lime. Texas.

Curly top (?). Peanut was affected by a disease believed to be due to the sugar beet curly top virus in Oregon. (McKay).

Recent literature

1. Ashby, S. F. Transmission of two diseases caused by infective viruses. 2. Rosette of ground-nuts. Trop. Agric. 3: 98. May 1926.
Review of work in South Africa. Rosette is a virus disease transmitted by Aphis leguminosae.

2. Steiner, G. Parasitic nemas on peanuts in South Africa. Centralbl. Bakt. Abt. II, 67: 361-365. July 1926.

PEPPER

Alternaria sp., fruit rot. New Jersey, Florida, Missouri, Porto Rico. A loss of 4 per cent was estimated in Missouri. (Archer).

Bacterium solanacearum EFS., bacterial wilt. Florida, Texas, Porto Rico.

Bacterium vesicatorium Doidge, bacterial spot was reported from New Jersey, Florida, and Missouri. Chupp says that the disease was rather common but not severe on the leaves in southern New Jersey; but was not observed on the fruit.

Botrytis sp., gray mold, on stems and fruit, New Jersey.

Cercospora capsici Heald & Wolf, leafspot. Florida, Texas, Porto Rico.

Cladosporium sp., leaf mold, Mexico, west coast. "This disease was bad in the Fuerte Valley, Sinaloa, on peppers." (A. W. Morrill).

Fusarium sp., wilt. Maryland, Arizona. In the latter state it caused a loss of 3 per cent, according to Streets.

Gloeosporium piperatum Ell. & Ev., anthracnose. Higgins (1) states that while at least five distinct species of Colletotrichum, Gloeosporium, and Glomerella occur on pepper fruits, Gloeosporium piperatum is the only one that is

actively parasitic. It attacks the fruit in all stages of development, and sometimes also the stems and branches, but is comparatively rare in pepper fields. The other species, including Colletotrichum nigrum Ell. & Halst., Colletotrichum sp., Glomerella piperata (Ston.) Spaulding & Schrenk, and Glomerella sp., are wound parasites, which attack the fruit through blossom-end rot spots and other wounds. They are much more common in the field.

In 1926 collaborators reported anthracnose under a number of different names, viz., Colletotrichum nigrum in South Carolina and Florida, Glomerella piperata in Delaware, Gloeosporium piperatum in Porto Rico, and Glomerella cingulata in New Jersey and Missouri. The loss in South Carolina was estimated at 10 per cent by Moore, and in Delaware Adams reported the canning crop as showing heavy infection.

Ozonium omnivorum Shear, Texas root rot. Texas, 1 per cent loss.

Pythium sp., root rot. Porto Rico, occasional.

Sclerotium rolfsii Sacc., blight. South Carolina, Georgia, Florida, Louisiana, and Texas.

Curly top (?). " A disease believed, but not yet determined, to be due to the sugar-beet curly top virus was unusually abundant in western Oregon. Both the symptoms and circumstantial evidence suggest the curly top virus as the cause and it was most abundant in bad curly top areas. It caused a loss of 75 per cent." (McKay)

Mosaic (virus). Pennsylvania, South Carolina, Florida, Louisiana, Indiana, and Porto Rico. A loss of 10 per cent occurred in Pennsylvania, according to Beach.

Recent literature

1. Higgins, B. B. Anthracnose of pepper (Capsicum annum L.) Phytopath. 16: 333-345. May 1926.

2. Malabanan, D. B. Anthracnose of pepper. Philipp. Agr. 14: 491-501. Jan. 1926.

RHUBARB

Ascochyta rhei Ell. & Ev., leafspot. Connecticut, Missouri.

Colletotrichum erumpens Sacc., anthracnose. Missouri, loss 5 per cent. (Archer).

Phyllosticta straminella Bres., leafspot. New York, New Jersey, Missouri.

Phytophthora sp., crown rot, was reported from Indiana. Archer reported a foot and crown rot, probably due to Phytophthora, as the cause of a 5 per cent loss in Missouri.

Phytophthora cactorum (Leb. & Cohn) Schröt., crown rot. Pennsylvania. Beach reported that nearly all seriously diseased fields in the vicinity of Philadelphia have been destroyed.

Curly top (?). Rhubarb is another host affected by a disease suspected to be due to the sugar-beet curly top virus, in Oregon. (McKay & Dykstra).

SALSIFY

Albugo tragopogonis (DC.) S. F. Gray, white rust. Iowa.

Curly top (?). Salsify was attacked by a disease believed to be due to the sugar-beet curly top virus, in Oregon. (McKay & Dykstra)

Yellows, due to aster yellows virus. Kunkel (1) reports that aster yellows was successfully transmitted to salsify, and back to aster.

Recent literature

1. Kunkel, L. O. Studies on aster yellows. Amer. Jour. Bot. 13: 646-705. Dec. 1926.

SOUR GRASS OR SCHAFF (RUMEX ACETOSA)

Phyllosticta sp., leafspot. New York, Nassau County.

SPINACH

Caconema radicicola (Greef) Cobb, root knot. South Carolina, southern Georgia. Apparently this nema is not common on spinach, since it has only been reported to the Survey once before, from Indiana in 1921.

Cercospora beticola Sacc., leafspot. Southern Georgia.

Colletotrichum spinaciae Ell. & Halst., anthracnose. Texas.

Fusarium spp., wilt. Fusarium sp. was reported from Arizona. F. solani (Mart. p. par.) Appel & Woll., caused a loss of 5 per cent in Texas. (Taubenhaus). Fusarium wilt, apparently F. spinaciae Sherb., was observed at one point in the central coast district of California on seed spinach, causing complete loss in some small plots. (Horne).

Peronospora effusa (Grev.) Ces., downy mildew, was reported from Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, Maryland, Virginia, South Carolina, Louisiana, Texas, and Indiana. Losses reported were: Texas 8 per cent; South Carolina, reduction in yield 3 per cent, transit loss 1 per cent; Maryland, reduction in yield 1 per cent, transit loss 1 per cent; New York a trace. In the Norfolk section of Virginia the disease was so severe on the early spring crop that its effects resembled those of blight (mosaic). McWhorter states that downy mildew is of more importance than mosaic in that section since the latter has been practically eliminated through the use of the resistant variety Virginia Savoy, and attempts to control the former have proved futile. On Long Island, according to Clayton, "Downy mildew is common and causes considerable loss, measured by crop, but less when measured by dollars, since late in the spring when the disease is most destructive the price is generally low." Jehle reported that in a variety test in Maryland downy mildew was very severe

on the varieties King of Denmark, Henderson's Improved Thickleaf, Victoria Thickleaf Virofly, Virginia Savoy, Broomdale, Round Thickleaf, Triumph, Long Season, and Princess Julian. Giant Eskimo and Prickly Winter were not so severely attacked. In Middlesex County, Massachusetts, Victoria and Savoy were badly affected, according to Guba.

Pythium debaryanum Hesse, root rot. Connecticut, one report, on old plants.

Rhizoctonia sp., root rot. In Camden County, New Jersey, in September, a field of young spinach turned yellow and seemed about to die. Rhizoctonia was found abundantly in and on the roots. (Dept. Plant Path.). Taubenhaus reported a loss of 1 per cent from Texas.

Yellows, due to aster yellows virus. Kunkel (1) reports spinach as one of the plants to which aster yellows was successfully transmitted experimentally.

Recent literature

1. Kunkel, L. O. Studies on aster yellows. Amer. Jour. Bot. 13: 646-705. Dec. 1926.

2. Taubenhaus, J. J. Studies of a new Fusarium wilt of spinach in Texas. Texas Agr. Exp. Sta. Bul. 343: 1-23. July 1926.

SWISS CHARD

Cercospora beticola Sacc., leafspot. New York, Texas, Missouri.

YAUTIA

Macrosporium sp. and Phyllosticta colocasiae Höhn., leafspot. Porto Rico, not important.